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AN EARLY HUNTING CULTURE

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A PALEO-INDIAN SITE IN EASTERN PENNSYLVANIA: AN EARLY HUNTING CULTURE

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In the years following the excavation of the Folsom, New Mexico "bison quarry," and the recognition of the significance of High Plains sites with delicate forms of fluted projectile points, the study of fluted point complexes took two directions. In the western United States, excavation and reconnaissance techniques were used to work out the artifact and faunal associations of fluted points within sites, and to provide geological context for Folsom occupation by study of the ancient river-level terraces on which sites were located. In the eastern area studies of this complex were entirely distributional and typological, and artifact and faunal associations remained unknown down to the present time.[1] No reports of cultural inventories for fluted point sites in the East existed in the literature or in the unpublished information of the archeologist. No information on the physiographic associations of sites or of series of stray points was available until recently.

Until very recently we had no reason to believe that fluted points were not merely a rare minority artifact type of one of our ordinary Archaic cultures. The excessive rarity of such projectile points in most eastern areas, as well as the select flints from which they were made and their resemblances in flint-knapping technique to later Archaic and earlier Woodland industries, suggested that the fluted point might even be an unimportant aberrant form in the East. As far as the record went, no sites which produced fluted points in any significant number had been found in the Eastern Woodlands. Recent recognition of several sites of this type now permits the identification of a new technological stage, Paleo-Indian, in the Northeast.[2]

[1] Major sources on fluted points from the Northeast, selected for typological information, include the following publications:

H. C. Shetrone, The Folsom phenomena as seen from Ohio, *Ohio State Arch. and Hist. Quart.* **45**: 240–256, 1936.

Edgar B. Howard, Grooved spearpoints, *Penna. Arch.* **3** (6): 11–15, 1934 (Howard's plate of eastern fluted points was reprinted in *Penna. Arch.* **5** (1): 40, 1935, with the erroneous caption, "Folsom points and Folsom-like points from Clovis, New Mexico").

Archibald Crozier, Delaware Folsom points, *Bull. Arch. Soc. Delaware* **3** (1): 8–10, 1939.

John Witthoft, Notes on Pennsylvania fluted points, *Penna. Arch.* **20**: 49–54, 1950.

B. C. McCary, A survey and study of Folsom-like points found in Virginia, *Quart. Jour. Arch. Soc. Va.* **2** (1).

Arthur George Smith, Fluted points from Milan, Ohio, reprint from *Southwestern Lore* **17** (1). Smith's specimens are Onondaga chert and seem to pertain to the Enterline Industry.

William Smail, Some early projectile points from the St. Louis area, *Jour. Illinois State Arch. Soc.* **2**: 11–16, 1951.

William A. Ritchie, *The Pre-Iroquoian occupations of New York*, Rochester Museum, *Memoir* **1**: 311–12, 1944.

[2] The term Paleo-Indian was originally used by Roberts for American cultural assemblages which appeared to be chronologically early, on the basis of geologic, faunal, or typological evidence, and I believe he used the term in a cautious non-classificatory sense, since he was obliged to handle many complexes of controversial status under this term (Frank H. H. Roberts, Development in the problem of the North American Paleo-Indian, *Smith. Misc. Coll.* **100**: 51–116, 1940). Griffin used the term in contrast to Neo-Indian, and extended Roberts' usage to include typical complexes of what I call the Early and Late Archaic Periods, as well as various Basketmaker complexes. In Griffin's usage, the term is a convenient label for complexes which are formally not Neolithic, particularly in economic pattern, and is offered in objection to widespread use of the term Archaic Pattern (James B. Griffin, Cultural change and continuity in Eastern United States archaeology, *Man in Northeastern North America, Papers Robert S. Peabody Foundation for Arch.* **3**: 37–95, 1946, pp. 40–43). I have used the term for a technological stage, presumed to equate with a time horizon, with the absence of pecking and grinding as a tool-shaping method as the major criteria; this usage is a refinement of Robert's usage, probably of limited value, but permitting precise and convenient classification of industries (John Witthoft, an outline of Pennsylvania Indian history, *Penna. History* **16** (3): 3–15, 1949, p. 13). The term is probably a barbarism to the classicist, but, in its several usages, fills important needs in American archeology. I also propose the name, Enterline Chert Industry, for the chipped stone assemblage at the Shoop Site described here, and use the name as a more formal equiva-

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Several sites of a fluted point complex were apparently known in our area at least ten years ago, and we have good reason to believe that others exist. At least five years ago I had heard rumors of a site of this type on an eastern terrace of Lake Champlain, and this site was carefully protected by a collector, William Ross, from 1922 until 1950, when William A. Ritchie of the New York State Museum and Donald Lenig of the Van Epps-Hartley Chapter of the New York State Archeological Association visited the Mark Reagen Site and examined the collection from there. According to the account they gave me, the Reagen Site was in a sand blow-out on one of the old beaches high above the Lamoille River near St. Albans, Vermont, and seemed to be now non-productive. The collection from it included a few finely-made fluted points and fragments, along with scrapers and other tools, some of them very unlike types described later in this article.[3]

The Parrish Site, in Hopkins County, Kentucky, is the only eastern site with a fluted point component reported in the literature which has been excavated.[4] This early occupation was not stratigraphically separable from a much more dense Late Archaic component, and still other

lent of Shoop Site assemblage at various places in the report. Distinct fluted point industries apparently occur in this and other parts of the Northeast, although they are not as well known in detail; the Parrish Industry is one of these.

I am deliberately avoiding use of terms of the Midwestern Taxonomic System, since I am not impressed by the possibilities of this mechanism for ordering archeological data, and do not believe there is any need for such a system of classification in the Eastern Woodlands today. This system is allegedly a statistical method for comparing sites and components, with a special set of terms for cultural relationships of different statistical orders. I find myself using terms from this set, such as component and focus, but merely as rough labels apart from their strict classificatory sense. In the East, with only a very few exceptions, cultural classifications following the Midwestern Taxonomic System are not the results of application of a special technique but are the usual archeologist's impressionistic orderings done up in a scholastic form; the soundness of such orderings is a factor of the common sense of the archeologist, and would never result from the blind application of statistical methods to trait lists which we so often identify with this routine of analysis. Since I am here dealing with only a few scraps out of the whole culture of a long-extinct community, I use other terms which may need clarification even though they have been in general use for some time. Alex Krieger, in correspondence, has emphasized need of this, since my use of fairly ordinary words as technical terms may be ambiguous and is certainly not consistent with everyone else's use of them.

I prefer to use the term "culture" in the archeology for the total recoverable remains and traces of a set of nearly identical communities; this is a "Focus" in the Midwestern System. An Industry is a series of objects which seem to be the result of one consistent manufacturing pattern. Most cultures include a variety of industries, as a bone-tool industry, a pecked-stone industry, a pottery industry, and perhaps several chipped stone industries. A site may have been occupied by a number of different communities at different times, and so may include several components, each of which is thought of as a unit in the archeological history. A component is the local, precisely definable unit of a culture. An assemblage is the total of objects found at a single site, and the term carries some implication of unity, although it does not necessarily mean they are to be considered as of one component. The Denbigh Flint Complex is here considered as an assemblage, even though it includes two industries. The term does not imply that I do or don't consider these two industries to have been contemporary. The Shoop Site is apparently a site with but a single component, including only one industry. Many other cultures include more than one flint industry, but this one did not. I have not used the term culture or focus for the Enterline Industry because we lack information about every other activity of these people besides their flint industry. In this article I am actually dealing with nothing more than this one phase of life of these early people.

The term Archaic may lead to some confusion because this word has been used to include what I call Paleo-Indian, even as Paleo-Indian has been used to include what I call Archaic. I think of the local archeology as classified first in a chronological framework and only after that in terms of intra-areal relationship. Such an outline includes three major technological stages, which equate, to the best of our knowledge, with major time divisions. The Paleo-Indian Epoch, so far not divisible into periods, lacked stone pecking and grinding techniques. The Archaic Epoch, provisionally divided into two periods, has as its "index fossils" ground stone tools but lacks pottery. The Woodland Epoch, now seen as four or five periods, was characterized by pottery-making. This triple division seems to be valid almost throughout the continent; it is not to be considered as a major tenet of American archeology, but rather as a tool for segregating cultures into natural classes for further study. Comparative parts of this paper are restricted to complexes which lie certainly within the Paleo-Indian Epoch and technological stage. The term "Early Hunter" has been used by Alex Krieger (Certain projectile points of the early American hunters, *Bulletin,* Texas Arch. and Paleon. Soc., 1947) as an alternative term for Paleo-Indian, to avoid confusions raised by various usage of that term.

[3] My impressions of this site are based on conversations with Ritchie and Lenig, and on a manuscript, A Probable Paleo-Indian Site in Vermont, by Ritchie. I have not recently examined the specimens found here. See Ritchie, *Pre-Iroquoian occupations,* 312, for earlier note and location of site.

[4] Wm. S. Webb, The Parrish Village Site, *Reports in Anthropology,* University of Kentucky, Lexington, 7 (6) : 403–451, 1951.

complexes may have been present on the site. Since much of the material from this site differs so strongly from the complex with which I am here concerned, and since some of these important distinctions may be of chronological import, I will attempt some comparison of this site with ours in the concluding portions of this paper. I believe the Reagen Site and the Parrish Site, along with the Wilhelm Site discussed briefly in this report, contrast with the Shoop Site (the subject of this report) and represent later fluted point industries.

Since I began the study of the Shoop Site, my attention has been called to the existence of two other sites, the Williamson Site in Virginia and site St 4 in North Carolina, which represent the same industry as the Shoop Site but which are not the same complex as is represented by the Parrish Site. These various sites, representing six different parts of the Eastern Woodlands, are discussed at greater length in a later portion of this paper; I believe they represent two somewhat distinct industries, and I am attempting comparison of them with one another and with Fluted Point industries of the High Plains.

An important site in eastern Pennsylvania has been known for at least fifteen years, however, although specific data from it have not been available until this year. The site was discovered by accident by George Gordon, of Palmyra, Pennsylvania, on the farm of his father-in-law, Morris Akens, near Enterline, Pennsylvania. Gordon, a collector of Indian relics and a competent surface-hunter, had done little collecting in the area around Enterline because sites were few and not productive. In taking a shortcut through a plowed field on the farm, which is a most unlikely looking place for an Indian site, he noticed chips and found a few artifacts. Despite the extreme thinness of the site, he continued to hunt this farm very carefully, because of the peculiar form of the projectile points which he found. About 1936 he showed his collection from this site to Sam Farver of Palmyra, and at this time he had eighteen fluted projectile points and fragments, and a larger number of scrapers. Farver borrowed some of the projectile points from him and showed them to the professional archeologists of his acquaintance but was unable to arouse any interest in them. At this time Gordon refused to divulge the location of the site, and, in fact, conscientiously protected the site until 1942. Farver, however, with some knowledge of Gordon's friends and relatives, was able to follow his trail to the site. Here, because of the very thin and spotty distribution of the industrial material, he was unable to find any indication of an Indian site; the fields in which Gordon had collected material were not then under cultivation, and adjacent fields were totally barren, as I also found them this year. Farver's failure to check the site was one reason for my later skepticism about Gordon's collection.

In 1941 Gerald B. Fenstermaker, of Lancaster, Pennsylvania, heard of Gordon's material. He examined the collection, and made sketches of most of the specimens, but was unable to learn the location of the site. Fenstermaker distributed blueprints of his sketches,[5] and one of these came to the attention of Edgar B. Howard, of the University Museum, Philadelphia. Howard visited the site at least four times, three of them with Gordon. He apparently did little surface hunting on the site, but dug a number of unproductive test pits, apparently all in a field which I have not seen plowed. Howard was the first person who learned the location of the site from Gordon. In 1941 Gordon exhibited part of his series at a meeting of the Eastern States Archeological Federation at the University Museum, Philadelphia,[6] and Howard later published a brief notice of the site.[7] In this article, which contains no data on the lithic industry, Howard published one specific bit of information—the precise location of the site. At the same time, Gordon showed the site to Frank J. Soday, now of Philadelphia, who collected on it in recent years and who has very kindly made his collections and notes available to me. Howard had been unable to find sufficient evidence on the site, had been unable to identify the flint of which Gordon's points were made,[8] and left no work in process on the site at the time of his death. He had abandoned the site by publishing a location and an altitude figure taken from a Topographic Survey sheet. Since Farver and Fenstermaker had been unable to get more definite information, and especially since no one of my acquaintance who had access to Gordon's material had followed up on the problem, Farver and I were extremely

[5] Blueprint, 10 × 17 inches, captioned "'Folsom' type artifacts found on/a site located in Pennsylvania/ Sketched for research/ July 15, 1941/ by Gerald B. Fenstermaker."

[6] Dorothy Cross, Minutes of the Eastern States Archeological Federation Annual Meeting, Philadelphia, Pennsylvania, *Penna. Arch.* 12: 7–14, 1942, p. 9.

[7] Edgar B. Howard, A "fluted point" site in Pennsylvania, *Penna. Arch.* 12: 4–6, 1942.

[8] *Ibid.*, 5.

suspicious of a fraud. Therefore, our first problem seemed to be to locate Gordon and get to know him and his collection. I had decided that the story would stand or fall on the basis of the flints from which his artifacts were made; if they were of the stones ordinarily used for fluted points in Pennsylvania, his account was probably correct. As a further check, it must be possible still to find chips of the same flints at the same weathering stage in the fields from which his specimens were alleged to come. The rest of my account is largely a substantiation of Gordon's statements about this site.

We were not able to locate Gordon until October, 1950, but I found him extremely cooperative; according to what I saw of Gordon's personality and character, his account should prove to be entirely reliable. Previous accounts of the material had not prepared me for the two cigar boxes of material which he produced, which included forty-one fluted points and characteristic fragments, one hundred and thirty-nine end scrapers, forty-nine pointed side scrapers, eight unfinished fluted points, and several hundred chips. One spall and two fluted points were of deeply weathered jasper, one point fragment was of black flint, weathered to a grey spongy surface, and every other bit of stone was Onondaga Chert, all very deeply weathered. I know of no other source from which Gordon could have obtained such a collection except from a local fluted point site, and that was something still unknown. A few days later we visited the site with Gordon, and later again without him. Farver and I found two fluted points, ten end scrapers, fourteen side scrapers and fragments, and two rejects on the site during these two visits, as well as a small quantity of chips. Later visits were less productive but continued to add to our picture of the site. Our sample matches Gordon's exactly in typology, lithic material, weathering, and (roughly) in artifact proportions; there is no longer any question of the source of Gordon's material or of the status of his site.

In 1942 Gordon showed his collection and the site to Dr. Frank J. Soday, who has since hunted the site at every opportunity. Soday has loaned his specimens to me and sent voluminous notes. His series includes 120 distinctive tools, as well as a large series of chips, and gives further weight to our sample, both by enlarging it and by adding another trained observer to the number of independent investigators. The proportion of different tool types in Soday's series is roughly like Gordon's, with end scrapers more numerous, but side scrapers show a high incidence in his series because he saved all fragments, whereas Gordon's collecting was selective.

THE LOCATION

The site itself is located on the present H. Dean Shoop Farm, formerly the R. H. Mohr Farm, and is scattered over more than twenty acres of a flat but irregular plateau, bounded on one side by an upper branch of Armstrong's Creek and on two other sides by tributaries of that branch.[9] There are at present four springs at the base of this hill, and an even grade from all sides gives easy access to the hilltop, which is high above the streams. The hill itself commands a large area of Armstrong's Valley north of Dividing Ridge, but is much too elevated and in too isolated a location for one to expect an archeological site. The valley in which it is located is one of the broader, rough valleys within the anticlinal ridges north of the Lebanon synclinal valley, and is bounded by steep mountain ridges on the north and south, and rises to rough mountain country on the east, so that it is only easily accessible from the Susquehanna Valley to the west, and is in effect a cul-de-sac. The valley floor is rough and unplaned, made up of hillocks and steep-sided valleys, with twisting rapid streams cutting against steep banks at every turn. The whole area, both in the lie of the land and in the sparsity of Indian material throughout the valley, does not seem to have been a good place for human occupation in recent times, and the topography resembles such valleys as that of the Chickiesalunga in Lancaster County, where sites are almost non-existent. (See fig. 1 for general location.)

If the site itself were any thinner it would not be a site. Eleven very slightly elevated areas on the flat hilltop, often more than a hundred yards apart, and generally less than thirty feet in diameter, usually yield about a half-dozen chips of all sorts and one or two artifacts after each cultivation. Areas between these productive spots are probably not barren because of erosion, else we would find industrial material on the slopes below. This spotty distribution of material seems to rep-

[9] The Shoop Site is located within the area covered by the Harrisburg, Pennsylvania, Topographic Sheet (15 minute map) and is located, on the printed map, 9 13/16 inches east of the west printed edge of the map, and 16 1/16 inches north of the south edge. Fig. 1 shows approximate location.

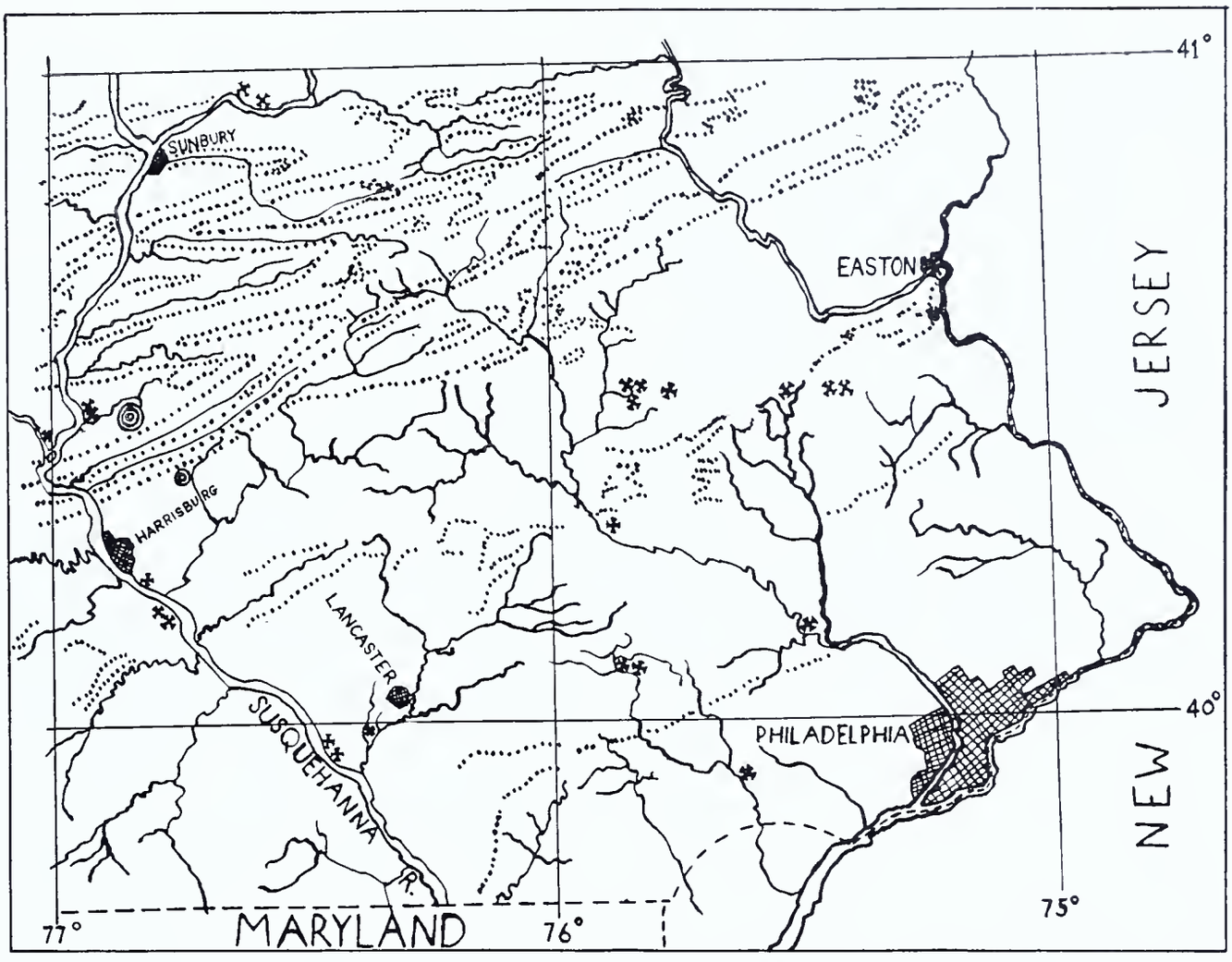

FIG. 1. Map of southeastern Pennsylvania. The Shoop Site is located within the triple concentric circles near the left center of the map, and the Wilhelm Site within the double concentric circles. Small crosses mark the approximate locations where isolated fluted points have been found in this portion of the state. Stream courses are marked by solid lines and only streams which were major Indian communication routes are drawn. Dotted lines represent the ridge-crests of mountains more than a thousand feet above sea-level. The stream courses and ridges developed on the local Appalachian series of folds are the major geographic features of the area.

resent the original nature of the site, and probably each spot represents a different camp or a separate hearth within a camp. Lower spots between elevations may have industrial material buried beneath slopewash, but we have found no evidence of this. Occasional chips and artifacts found outside of these productive spots have probably been transported by farm machinery, since they are so infrequent. Recent breakage of artifacts and chips by farm implements is very frequent.

The soil itself is a very thin sandy soil formed from underlying shale, and is filled with shale fragments. Disintegrated bedrock in place generally comes to within a foot of the present ground surface. This is a sandy red shale of the Catskill series, without softer zones or harder flag-like layers. Tractor-plowing was begun here only a couple of years ago, and in many places the plow is bringing up disintegrated bedrock from below the soil limits. Sandy shale blocks and a few quartz crystals are apparently derived from the bedrock. It is my impression that this land surface has changed little in recent times, except for sheet-wash erosion of humus and tiny soil particles, accelerated by plowing in the past century.

The typology, technique, and lithic material led me to consider the material from this site to be a single industry. The few exceptions are discussed separately below. The material from the Shoop Site is startling mainly because it is such a clean and clear-cut picture, with an exceedingly restricted artifact inventory. Because of restrictions

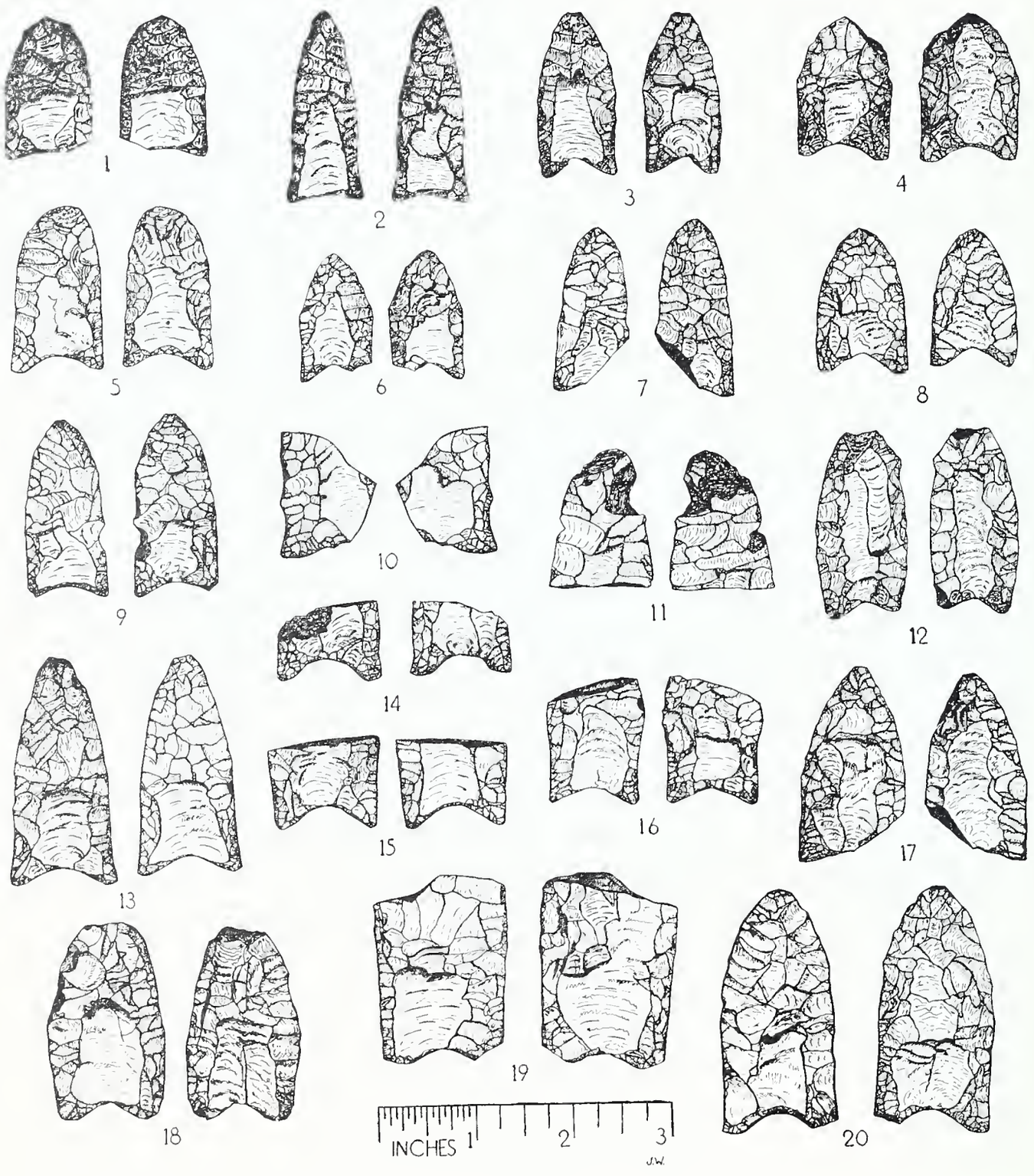

PLATE 1. Fluted points from the Shoop Site.

3, 15. Pennsylvania State Museum Collection, D[a] 20/1, others George Gordon collection.
19, 20. Pennsylvania jasper, rest are Onondaga chert.
4. Tip fire damaged.
9. One side recently damaged (chipped) by farming implement.
11. Tip area fire damaged.
14. One upper corner fire damaged subsequent to breakage. Edges not ground.

I now believe I have overlooked multiple channel flaking in drawings nos. 8, 10, 14, 15, 18, 19, and 20. These show evidence of smaller lateral fluting beyond that shown.

in lithic material, flint chipping technology, and artifact form, there can be no question that we are dealing with a nearly closed site, and that our particular scraper forms must have been made by the same people who made the fluted points. An assemblage of six tool types with utilized spalls makes up the Enterline Chert Industry.

Several artifacts have been found which are exceptions to this statement, and they apparently represent stray objects lost by later people hunting in this area but not living here. One is a musket ball, of slightly under sixty-five caliber, most likely of the late eighteenth century, found by Witthoft, who also found the hair-trigger of a Kentucky rifle on the site. Two stemmed spear points of grey-black cherty shale and a rhyolite spear tip were found by Witthoft, and two fragments of stemmed spears of black flint were found by Gordon. A corner-notched point, five stemmed examples, and three triangular points have also been found here by Soday. The corner-notched point is made of chert, but the rest are of stones not otherwise represented on the site and are probably stray points lost in hunting by later peoples. These points are not deeply weathered, and in technique and lithic material differ from everything else on the site; they are therefore ignored in later discussion.

FLINT VARIETIES

The lithic material of the Enterline Industry is one of the most startling features of the site. In eastern Pennsylvania, the vast majority of fluted points in collections are made of Pennsylvania jasper. A fine grained black flint was the next most popular material, and Onondaga chert the third, with almost no specimens known of other materials. Many New York points are of jasper carried north from Pennsylvania. The total series from the Shoop Site, however, includes only two fluted points of jasper (found by Gordon) (pl. 1, nos. 19, 20), two jasper flake scrapers (found by Witthoft) (pl. 4, no. 12), one large jasper spall (Gordon), one side scraper (Soday), one end scraper, three tiny retouch flakes, and two spalls of jasper (Witthoft). The very fine quality black flint is about half as abundant as jasper in the collections seen from the state. The only artifact made of it from the Shoop Site is a fragment of a fluted point found by Gordon, while Witthoft found two tiny retouch flakes of this stone on the site. The source of this flint is not known with certainty, but I believe it is identical with the black flint or "touchstone" found as a variant of the jasper at the few known jasper quarries in Bucks, Lehigh, and Berks Counties in eastern Pennsylvania, but found in abundance only at the quarry at Macungie, Lehigh County. The jasper certainly came from these sources, and so our site has minority materials derived from within a very limited area in eastern Pennsylvania.

A few other materials are represented in more recent collections from the site. Deepkill flint, from the Hudson Valley, very likely from the Coxsackie outcrop, is the material of a single tip of a blank or reject found by Soday. An unfinished point (pl. 2, no. 4), deeply weathered, is Normanskill chert from the Hudson. A single chip of local chalcedony, probably from the Ordovician shales of the Lebanon and Oley Valleys of Pennsylvania, may or may not have come from the fluted point occupation. A very few fluted points of this stone are known from eastern Pennsylvania. A single retouch flake of non-local chalcedony is Flint Ridge, Ohio, material. Six chips and an end scraper (pl. 4, no. 29) of a drab, slightly granular white chert, almost opaque and without a glassy surface, are from a stone which I have never seen before. A single spall is of the streaked gray chert of the Williamson Site in Virginia, discussed later. Two side scraper tips (pl. 2, no. 17) are of light brown chert with abundant white quartz spherical (oolitic?) inclusions and fossil casts; it is a stone of non-local origin which I had never seen before. Arthur George Smith, of Norwalk, Ohio, found this stone represented in his Ohio collection by two chips, and these are the only other specimens of this flint which I have ever seen.[10] A finely-made end scraper with one oblique edge (pl. 4, no. 18) was made of a very dark brown chert of fine texture which is entirely new to me, and which must have also originated at some distance. It is possible that a better knowledge of the minority flints of sites of this type may become an important tool in suggesting relationships and directions of movement of peoples in this early period.

The remainder of the material from this site, well over eight hundred fragments, is Onondaga

[10] Correspondence with Smith has been one pleasure incident to study of this complex, and he has supplied most of the comparative material which I have seen from northeastern Ohio. Samples which he sent included a fair number of tools of western New York Onondaga Chert of several periods, including fluted points, flake tools, and end and side scrapers apparently of the Enterline Chert Industry from the Huron Valley.

chert of the mottled bluish western New York phase, according to my own gross judgment and Charles Wray's mineralogical study of the material.[11] This very distinctive chert, extremely resistant to weather and ideally adapted to flint-knapping, is not unusual in Susquehanna Valley artifacts, but it is almost always a minority material. It occurs as nodules and lenses in the Onondaga limestone in western New York and the Ontario Peninsula, and extensive outcrops with vast evidence of Indian utilization are conspicuous in several places west of Batavia, New York. I have not seen this very mottled phase of the chert in Pennsylvania outcrops or in the New York Helderbergs, but it is most characteristic of western New York Onondaga. Especially in Middle Woodland times, blanks from western New York outcrops and finished tools of New York Point Peninsula types were carried into all parts of Pennsylvania. Pebbles of this chert are common in till in northern Pennsylvania, and are found in the river gravels of the Susquehanna all the way to the Chesapeake Bay. In Late Woodland times these pebbles were a favorite flint source, and broken Onondaga chert pebbles and small tools made from them are common in late sites. Fluted points of Onondaga chert are well known but are not common; I have seen ten of them in collections from this state.

The proportion of this easily identified chert at the Shoop Site is surprising, since it is very different from the chert preferences indicated by stray fluted points in collections. The source of supply of this chert is an important question, since it indicates the direction of relationship of this culture. Several important bits of evidence seem to answer this question. First, the proportion of chips to finished artifacts is abnormally low at the Shoop Site; less than three chips, including tiny retouch flakes, per finished artifact have been found! Many of these chips show evidence of use of cutting tools, and many of them are the result of resharpening scrapers. There are no flint blocks, nodules, or rough rejects on the site. Therefore few of the tools were made here, but most of them were finished at some other place while some of the fluted points were brought here as leaf-shaped blanks. There is no evidence of any working of blocks or spalls into blanks, and surprisingly little evidence of tool-elaboration from blanks. No channel flakes from fluted points have yet been found on this site (although four fragments have recently been found; one is illustrated in pl. 3, no. 1), nor have any unfinished scrapers turned up. Fragments of river pebbles of chert have not been found, and no artifact or chip from the site shows any trace of a pebble surface. This contrasts strongly with other Onondaga chert-producing sites in the Susquehanna Valley, where such pebble surfaces are abundant. At least twenty spalls and tools do show nodule surfaces, however, such as occur at the Onondaga chert outcrops but which are invariably obliterated on stream pebbles. I feel certain from this evidence that the Onondaga chert was carried here from western New York, predominantly as finished tools but partially as blank forms, rather than being derived from pebbles of the Susquehanna outwash.

Thus the relationship of the Shoop Site is overwhelmingly to western New York, and weakly to eastern Pennsylvania. This matter of the direction of derivation of the lithic materials is extremely important, and I will return to it in my conclusions. Several other details about the stone are very significant. The flints found at this site are the most weather-resistant of any used in the area; in fact, rock crystal and Hardiston quartzite (from the South Mountain in Berks and Lebanon Counties, Pennsylvania) are apparently the only stones used locally which are more weather-resistant. Nevertheless, all of the chips and tools from the site are very deeply weathered compared to any tools of the same stones known from other industries. The jasper has developed a porous, somewhat gritty surface, light in color, and the chert shows a light-colored less dense zone of extreme weathering more than a thirty-second of an inch deep on all old surfaces. The jasper is more deeply rotted than this, and is the most weathered Pennsylvania jasper I have ever seen. These stone specimens show a much more advanced weathering stage than the same stones do on any other sites of any other local industry. A thick surface zone has had a large part of its non-crystalline silica constituent dissolved, whereas Late Archaic specimens of the same stones show a little more than a film of such disintegration. This must be due to relative age rather than

[11] Wray has examined the bulk of Soday's and my sample from this site, and agrees that the material originates in the Onondaga of western New York or perhaps in the little-known Onondaga of the lower Ontario Peninsula. A published statement of the mineralogical characteristics of this chert is included in the following: Charles Wray, Varieties and sources of flint found in New York State, *Penna. Arch.* **18**: 25–45, 1948.

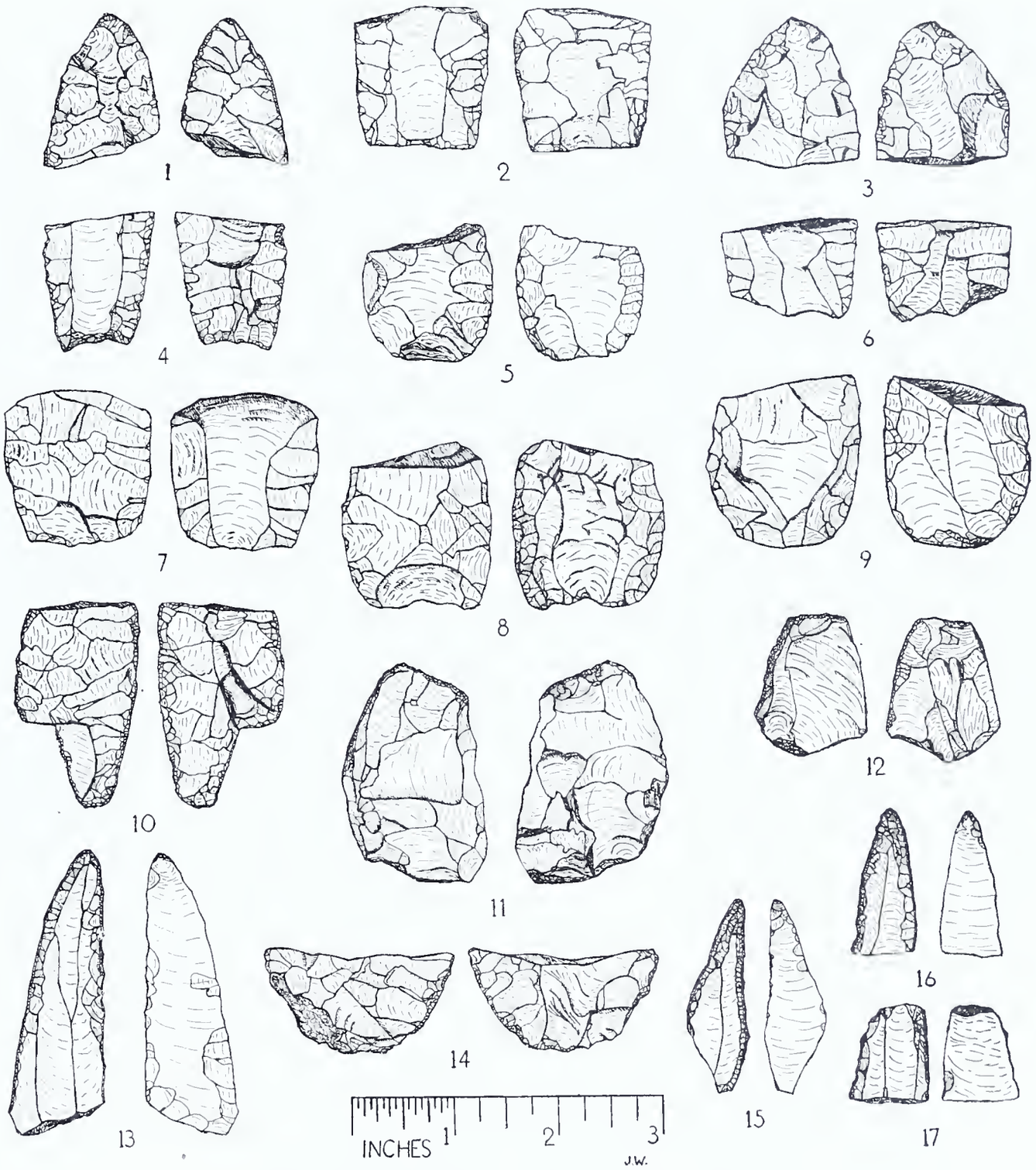

PLATE 2. Unfinished spearpoints, knives, and side scrapers.

1, 3, 11, 12, 14, 17. Pennsylvania State Museum Collection.
2, 4. Frank Soday Collection.
Rest. George Gordon Collection.
4. Normanskill chert (?), badly weathered.
17. Brown fossiliferous chert of unknown source, rest are Onondaga chert.
1. Intact tip of fluted point, apparently finished.
2, 4. Nearly completed fluted points.
3, 5–9. Blanks broken in process of elaboration into fluted points, not used as tools.
10. Blank broken along flaw (open vein), retouched as knife and scraper. The tip of this specimen has been found recently.
11. Blank, apparently rejected, used as a knife and scraper.
12. Spall from blank, apparently a channel flake failure, used as a knife.
14. Base of ovate knife, fire-damaged along lower edge.
13, 15–17. Side scrapers; 16 and 17 are incomplete, and 15 is the thinnest example from the site, and might be considered a highly retouched flake knife.

local soil characteristics, else such a strong and clear-cut contrast with specimens from many hundreds of other sites would not occur. This weathering is quite uniform on the whole Shoop Site series. None of the flints from the Shoop Site show any trace of wind-polish.

The flints of the Enterline Chert Industry are, by the criteria of the flint-knapper, the most tractable and best silicas available in the New York-Pennsylvania area. In Middle Woodland times, the apex in local flint working, they were the favored materials. The jasper, especially, comes from very local and inconspicuous sources and the chert has a quite restricted area of origin. I have often wondered whether a local fluted point industry might have emphasized more readily obtainable local stones such as rhyolite, argillite, cherty shale, and similar non-flints. Artifacts of some of these stones would be weathered beyond recognition by now if the fluted points were of any great antiquity. However, the Shoop Site has produced no chips, spalls, or blocks of any introduced lithic materials beside the flints described, and any others present in quantity would have been found, even if of completely weathered-out argillite. Thus it seems certain that our industry is restricted to these choicer materials. In terms of our presently-held ideas of culture sequence in the area, this presents a paradox. The earliest industry utilized only the very best flints which came from very restricted sources. The next succeeding industries of the Early Archaic Period used little if any flint or chert in southeastern Pennsylvania, but made all of their tools from argillite, rhyolite, and quartzite, which were much more readily available. These people did make a few ground and polished stone tools, but their projectile points do not show basal grinding. Next, the varied cultures of the Late Archaic Period continued to use the rough non-flinty stones but also used flints, cherts, and jasper. Not until the much later Middle Woodland Period do we have a return to almost exclusive use of good flints. Furthermore, there are tremendous differences in flint-knapping technique and typology between the fluted point industry and any of the Early Archaic industries, and there is evidence of a break in continuity in almost every detail of the surviving cultural inventories.

The flints from the Shoop Site bear abundant evidence that the site was an occupied area, regardless of how thinly the material may be distributed. About ten per cent of the chips and tools show evidence of fire. Four of the jasper artifacts are burned red, by the roasting of their coloring limonite. A higher proportion of chips than tools show fire spalling, but this distinctive type of non-conchoidal shattering out of surface is conspicuous on all types of tools. I cannot remember handling any series from any other site with so high a proportion of fire-spalled chips. On the other hand, distinctively fire-broken and burned stones of other materials have not been seen on the site.

One strange negative trait of the Shoop Site is the apparent total absence of carried-in stone other than flints. Most local Indian sites have an abundance of river stones and odd rocks, often fractured by percussion and fire and colored by heat, which have been transported to the site from other sources. The Shoop Site lacks these, and no possible hammerstones, grinding stones, or anvils of any sort have been found. They have been searched for most intently.

CHIP FORMS AND FLAKE TOOLS

Several types of chips were found at the site. Blocky spalls of chert, triangular or prismatic in cross-section, tapered, and of no regular form, are not abundant. They are not chips removed from a core in tool-making, but are from hammer-broken blocks and are the result of gross breakage or coarse trimming. The majority of such spalls in the sample were used as cutting or gouging tools, and show chippage and wear from use at a tip or along a steep edge. Another chip form is quite distinctive, although not abundant. It is thin and broad, rectangular in cross-section, with square edges; and the flat faces are almost perfectly parallel, with a bulb of percussion following almost exactly the contour of the scar (negative side) of a bulb of percussion, on the opposite face, left by a previously removed chip. These sheet-like chips suggest that flaking control was sufficient to split a chert block into shingle-like slabs. One such chip was used as a scraper, but most were not utilized, and were probably a product of preliminary shaping of tools or cores.

The most abundant chips are prismatic flakes, mainly in two sizes. The larger ones are about a quarter to a third of an inch wide, and up to two inches long (based on fragments), triangular or trapezoidal in cross-section, and thinner than almost any of the Hopewell or Mexican flake knives (pl. 3, nos. 1–3, 8–11, 13). They show a very slightly elevated and broad bulb of percussion, very difficult to define on many specimens.

The plane face on many has strong concentric strain waves (oyster-shell surface) along the whole blade, concentric to the bulb of percussion, and many of these chips ended at a hinge fracture. Some of these chips are short and not especially distinctive, and were formed in the thinning and shaping of tools. Others are fragments of long and carefully drawn bladelets, and resemble channel flakes except that they lack cross-flaking on the convex face. Many of these more typical flake knife fragments show chipping and wear along the edges and at a tip. Striking platform remnants on many of these flakes show much bruising and splintering, apparently a result of the particular flaking technique used. Exhausted cores from which such flakes could have been struck were found. Very few of these longer flakes curve but have a plane face that is almost flat.

Smaller prismatic flakes are the most abundant chip-form on the site, and are the retouch flakes from projectile points and scrapers. They are almost all triangular in cross-section, a sixteenth to a quarter of an inch wide, proportionately thicker than the flake knives, and often somewhat curved. Edges are surprisingly parallel, a bulb of percussion is very slightly developed, and there is very little taper or irregularity from the thick edge to the end of the flake. These flakes correspond well with the flake-scars on the fluted points, and many of them also seem to be the result of trimming and reshaping the scrapers described later. A few of the larger ones were used as tools without retouching (pl. 3, nos. 2, 11, 13).

Other more irregular flakes and spalls occur, but they are less abundant and seem to be extremes of these types. Several details concerning the chipping seem noteworthy. There is a high proportion of flakes ending at a hinge fracture, generally at the end of a long, flat flake rather than an acutely tapering one. Often hinge-fractured flakes, as well as others, show a concentric wave-like surface concentric to the point of impact. These details are especially conspicuous in the channel-flake scars of fluted points from all parts of the Northeast, but at this site they are more conspicuous in blade-making and tool shaping. In contrast, Hopewell blade-elaboration from polyhedral cores resulted in flat plane surfaces and few hinge fractures. Certain types of flakes are absent at the Shoop Site; for example, the tiny sheetlike pressure-flakes typical of late horizons and the very large, flat, broad type of flake most distinctive of the soapstone vessel horizon in the Susquehanna Valley. The random, irregular type of flaking found on Late Archaic sites and the thick, flat flakes which taper almost from the striking platform, typical of lower Susquehanna quartzite industries, are lacking. Large chips of any sort are infrequent, and the ones found are usually either flake knives or the thick spall tools first described. The majority of larger flakes represent tools rather than a mere by-product of tool-making. The flaking does not resemble that done by either stone or antler tools, and I suspect that it was done by both percussion and pressure with tools of fresh bone, judging by my own experiments.

The pattern of secondary chipping is best illustrated in the side scrapers, although it is equally characteristic of the other tool types. This pattern is frequently disguised by resharpening and re-edging, but shows best on some of the less-used specimens (pl. 2, nos. 13 and 16; pl. 3, no. 28, for example). Chipping along an edge was not sequential, nor were alternate chips drawn from opposite faces of a biface tool. Instead, two chips were removed along an edge, with a space of an eighth to a third of an inch between the striking platforms, and then a chip drawn between them, removing part of the two earlier flake scars. Then another chip would be removed farther along the edge, and the next chip removed from the space between that scar and the sequence previously chipped. This is a technique basic to the whole Enterline Chert Industry, not so much clearly defined on a few distinctive specimens as consistently shown by the whole series of blade tools and projectile points. This technique is basically distinct from stepwise, sequential flaking as exampled in the Lindenmeier Industry, and also contrasts with alternating-face chipping as seen in many Indian industries. Many lithic industries, indeed, show little preference and include examples of several different chipping patterns, but the Enterline Industry does not include clear-cut examples of any other sequence.

I think the broad relationships of this procedure are of some significance. I have already noted the lamellar nature of the retouch flakes from the site which are a result of this type of chipping. In the Enterline Chert Industry, the basic pattern in chipping is a blade and core procedure, whether the application was to blade-making, channel flaking, or secondary chipping on blades and on biface tools. It would be too much to claim that the secondary chipping technique was derived from a

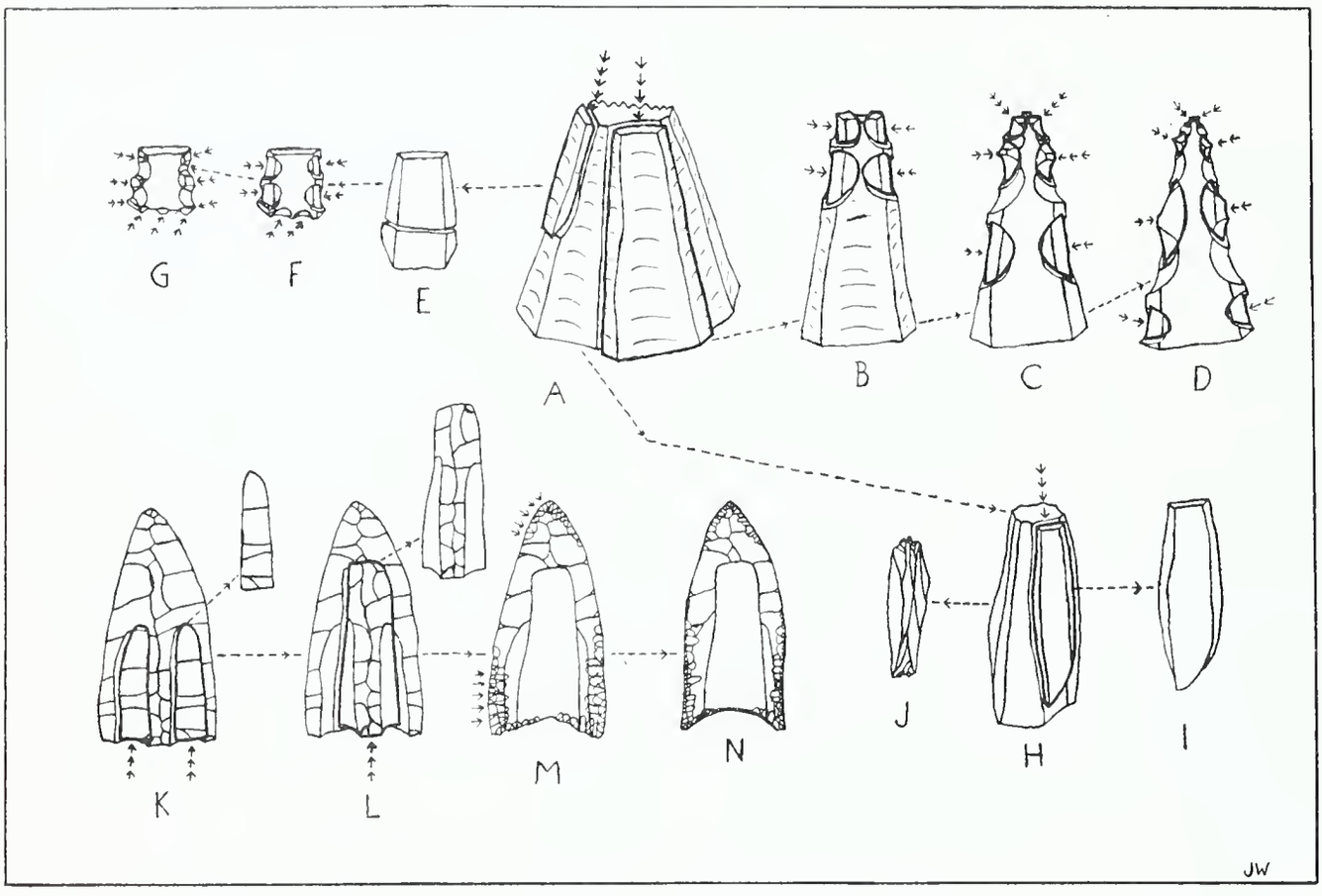

FIG. 2. Idealized sketch of the flint-chipping industry of the Enterline Chert Industry. Larger flakes are drawn slightly displaced from their positions of origin on the tool, as though being struck off. Multiple arrows represent the direction and percussion-point of the blow by which each flake was removed. *A* represents the removal of blades from a polyhedral core, probably of more regular shape than most of those actually used. This is a reconstruction since no prepared and unused cores have yet been found. *B*, *C*, and *D* represent the shaping of a pointed end scraper from a blade by alternate flaking, prior to the final pressure retouch of the edges (which is not indicated). Flakes drawn are larger and thicker than most of those actually removed. *E*, *F*, and *G* represent the shaping of an end scraper from a blade-base by alternate chipping, prior to the final edge-retouch. *H* represents a partially exhausted core, from which blades have been removed earlier, and which now serves as a source for flake knives or bladelets. *I* is a flake knife removed from a core of this type, used as a cutting tool without further modification. *J* is the final nucleus of the exhausted core, from which flake knives have been removed until it became too small to serve as a flake source. *K*, *L*, *M*, and *N* represent the elaboration of a fluted point from a blank. *K* shows the removal of the two side channel flakes in preparation for the final flute, and *L* shows the removal of the final flute from the faceted area prepared in *K*. Both types of channel flakes removed are also drawn separately. *M* represents the final shaping of the tip and base of the point by pressing off small flakes, and *N* shows the final projectile point as modified by pressure retouching and the grinding of the basal edges.

blade and core tradition, but it is consistent with this tradition. At the Shoop Site, the basic procedure involved the making of facets and the drawing of faceted flakes in a surprisingly consistent fashion, whether the flakes were large blades or small retouch flakes. In this respect, the Enterline Chert Industry is a remarkably clear-cut blade industry, of a pattern which is totally new for the Eastern Woodlands and perhaps for the whole United States and Canada.

Sometimes cores were damaged by hinge fracture during blade removal, and blades and core fragments which show this type of failure are included in the sample. One of the nuclei from the site (pl. 4, no. 11) was broken by a hinge fracture, and the thin tip thus produced on the core used as an end-tool. Several flakes have a facet pattern which shows that they were removed from a core after it had been broken by this type of fracture. The illustrated example was used as a knife or sidescraper without secondary flaking (pl. 3, no. 12). This breakage of cores was the same accident to which fluted points were prone during channel flaking. Such hinging in core re-

duction is believed to be a fair diagnostic of the Enterline Industry. The only other site where I have found such hinge-broken core fragments and blades is the workshop immediately east of the jasper quarries at Vera Cruz, Lehigh County, Pennsylvania, where two fluted points and a few scrapers of the Enterline Industry have also been found.

CORES AND BURIN-LIKE TOOLS

Peculiar flint fragments representing cores and used flint scrap are not burins in any sense of the term, but show rather curious resemblances to the Old World tool type in form and usage. In use they are apparently related to fourteen small pointed spalls of triangular cross-section which were accidental by-products of flake knife manufacture but which were used for engraving or gouging (pl. 4, no. 3). The five nuclei are the used-up remnants of polyhedral or cylindrical flint cores from which lamellar flakes were struck (pl. 4, nos. 9–11). They have been used as flake sources far beyond what I would have guessed was their exhaustion; much more than any Mexican or Hopewellian nuclei that I have seen. At their present stage, all traces of a striking platform have been chipped away at both ends, and the cores have even been shortened by flake removal after the flat ends were gone. The final flakes drawn from them were short and tiny for any blade industry, and were near the lower limit of size for any usable flake tool. Finally, the sharp ends of these tiny splinters from the centers of cores were used as pointed tools for gouging, and show wear and chipping from use. These cannot be anything but the exhausted nuclei from cores, but they are at so extreme a stage of wastage that I hesitate to compare them with any normal cores of other industries, in view of the absence in our samples of any core discarded while still usable as a flake source. The flake knives described earlier must have been struck from such cores before they became so reduced in size. Very likely large cores of pyramidal form, incompletely shaped from nodules with some of the crust remaining, were the sources from which were struck the heavy blades used for scrapers. After they had been much reduced in size, the smaller core remnants were used as a source for bladelets for flake knives, until finally the cores were so reduced that even small slivers could not be removed from them; this is the only stage at which they are found in our sample (the blade-making sequence is outlined in fig. 2).

The blades and flake tools show some details of the cores from which they were derived, and it appears that the first blades removed from the cores were the large slivers used as scrapers, and that flake knives were generally removed from the same cores at a later stage, when the core was reduced in size. The number of blades with a nodule skin preserved as one edge (instead of a facet) shows that the cores were not completely cylindrical or conical forms but were segments of a truncated cone or of a cylinder (pl. 3, no. 29, 30). Onondaga chert is not available as large blocks at the outcrops, and the blocks available would only have been large enough to shape faceted core faces on a part of the block. The facet angles on the blades indicate that such cores would have originally been two to five inches in diameter. Striking platform remnants on the blades are not perpendicular to the axis of the blade, and the blade facets frequently taper. This suggests their derivation from a core which was truncated-conical or biconical in form rather than cylindrical, with flakes drawn from the smaller end of the core. As the core was reduced by the removal of tapered blades, the core would become more cylindrical in form and better adapted to bladelet manufacture.

The other peculiar gouging tools are four flat spalls which have been splintered away at the corners in somewhat the fashion of a burin. The flake scars at these corners do not show the negative bulb of percussion characteristic of the re-

NOTES ON PLATE III

1, 3, 5, 7, 9, 10, 12, 13, 14, 18, 19, 20, 21, 22, 29. Pennsylvania State Museum Collection.

2 4, 6, 8, 11, 15, 16, 17, 23, 28, 30. Frank Soday Collection.

28. Pennsylvania Jasper, 30 brown chert, rest are Onondaga Chert.

1. Channel flake fragment used as flake knife, with bulb of percussion (base) at upper end.

2–11, 13. Flake knives, showing range of size, pattern, and retouch. Fragments are arranged with all percussion-point ends oriented to the top. 3 has been fire-shattered at the center, and the mid-part has not been found. All other specimens are fragments.

12. Short blade drawn from a core previously hinge fractured; face shows the negative scar of the hinging flake. Used as a knife or scraper at the side edges, but not modified by secondary chipping.

14–30. Side scrapers and fragments. 29 and 30 have an old nodule surface along one edge. 24, 26, and 29 were shaped with the point at the end of the blade opposite the percussion point, and are non-typical in this respect. 14, 21, and 26 show recent damage from farming implements. 22 shows a well-defined graver at the lower left end, and a probable worn-out graver tip on the base nearby.

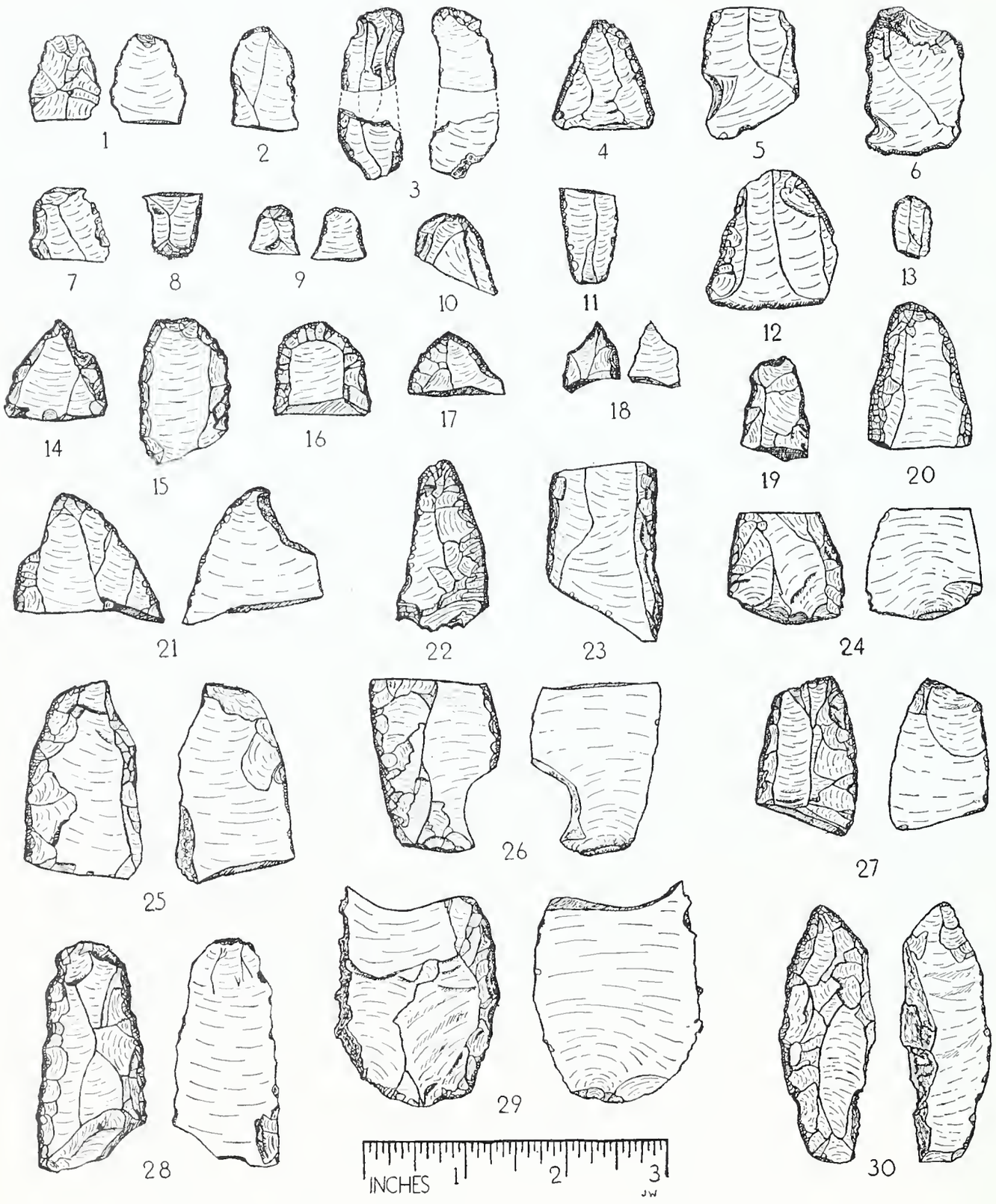

PLATE 3. Flake knives and side scrapers from the Shoop Site.

moval of a burin flake, and so the form is not the result of a burin technique but of force applied to the corner of the tool in a diffuse fashion during use as a gouging tool. I am certain that these resemblances to burins are superficial and accidental, although I am hesitant to describe our forms on the basis of such a small sample (pl. 4, nos. 1, 2). They are illustrated in the hope that related sites may produce less ambiguous examples, or that better interpretation may throw more light on these odd forms.

SCRAPERS

Scrapers of two types were based on heavier lamellar flakes. The evidence of used edges shows that neither type was hafted. The more striking of these are pointed tools, an inch to three inches long, steeply retouched on the two long edges and generally at the tip (pl. 2, nos. 11, 15–17; pl. 3, nos. 14–30). The lower, plane side of the flake is flat and unmodified; remnants of the bulb of percussion are generally at the point rather than at the broad end of the tool. These tips have been retouched so that the elevation of the bulb is at the working end, and the lower face back of the tip is concave. The flakes themselves are generally somewhat curved, although a few are nearly flat. The blade on which these scrapers were based is almost always trapezoidal in cross-section, although some were triangular and some were simple spalls. Edge-retouching is extensive and steep (fifty to sixty degrees), and the blade itself is proportionately much thicker than are the flake knives. These were scraping and gouging rather than cutting tools, and worn specimens show greater use and breakage at the tip than along the retouched edges. In this respect they are related to the heavy utilized spalls found on the site. The sample available, from Gordon's, Soday's, and my collections, includes eighty-eight of these long scrapers and distinctive fragments, not including tiny tip fragments and small sections.

These side scrapers make up a somewhat variable blade series, in which the crude extremes are less numerous. Simple spalls of large size were sometimes retouched along one edge, without shaping the top or all of the edges; these variants and fragments apparently broken from them are not well represented in our collections (pl. 3, no. 22). The average side scraper was based on a carefully drawn flake of tapered lamellar form, generally with the bulb of percussion at the narrow end. The broad end was rarely modified, but the narrow end was worked down to a sharp, acute tip. This tip has been broken away on most of the blades, but a number of intact tip fragments have been found (pl. 3, no. 18). Some examples have a straight scraper bevel chipped across the tip, and may represent the reshaping of pointed side scrapers after the tips had been damaged (pl. 3, no. 15). The usual scrapers were retouched to a steep bevel along both edges, whereas those based on spalls usually have one edge steeply retouched and the other edge thin and chipped only by usage as a knife. Rougher spall scrapers frequently have a nodule surface preserved at one edge (pl. 3, nos. 29, 30). Even without extreme examples, the typical scrapers represent a blade tradition otherwise unknown in the Northeast but very familiar in many Old World cultures. A few examples were based on lamellar flakes which come so close to the ideal pattern and execution that they would be difficult to distinguish from fine specimens of some of the classic European blade industries (pl. 2, nos. 13, 16, 17). The smaller end scrapers were based on the same blade forms, and some of them also have a startling Old World appearance.

The other scraper form, a short end scraper or planer, is the preponderant artifact in our series, more abundant than the total of other artifacts on the site. Two hundred and four of these from the Shoop Site have been examined. They were made from short, thick lamellar flakes, often as broad as long, which must have closely resembled a modern European gunflint (although slightly thicker, and not like the older wedge-shaped gunflint) (pl. 4, nos. 13–35). Sometimes they were trimmed by longitudinal flaking, but generally were only retouched to shape. Typically they are trianguloid or rectangular, while a few are somewhat irregular in shape. The plane faces are unmodified and the bulbs of percussion are almost always at the back (non-working) end, in contrast to the long side scrapers. The working edge has a steep retouch (sixty to ninety degrees) formed by parallel, fine, long flaking. The retouch on the other edges is less regular, broader, less steep, and left a blunter edge. None show evidence of hafting. Surprisingly few of these scrapers show evidence of wear, but several show remnants of a worn edge which had not been resharpened. I have seen very few scrapers which resemble these in other Pennsylvania collections; the flake-form on which they are based and the flat, parallel type of retouch flaking seem especially distinctive.

Trianguloid specimens, based on short tapering flakes, are triangular or trapezoidal in cross-section, and have one major working edge, which was steeply retouched and apparently resharpened until the slope of the scraping bevel became too steep. The bulb ends of these flakes are generally not modified by secondary chipping, and the sides are much less retouched than the ends, and are often somewhat irregular (pl. 4, nos. 14, 19, 20, 24, 30, 31). A few have roughly concave edges, which appear to be accidental results of use rather than an adaptation to hafting. Strongly developed points at the front corners of some examples appear to be important details of these tools, and are discussed later. Although the lateral edges do not appear to have been intended as primary working edges, some of them have had chips driven off the lower edge, along the plane face of the scraper, by use as tools. Some of the trianguloid end scrapers are carefully chipped on all edges, and three are long and narrow (pl. 4, nos. 20, 29).

Rectanguloid specimens are almost all trapezoidal in cross-section, and are frequently thin compared to the trianguloid forms. Many of them show less resharpening. They were generally based on a more pronounced lamellar blade, and some are almost classic examples of a short blade industry of this type (pl. 4, nos. 17, 18, 25, 27). Typically, scrapers of this form have a back margin that is not retouched or that is chipped like the lateral edges. Seven specimens have scraping bevels as well developed at both ends (pl. 4, nos. 17, 18, 29, 32, 33). One of these, a sharply-defined blade tool of a peculiar non-local chert previously discussed, has an oblique scraper edge with an acute worn point at one end (pl. 4, no. 18). The rectangular forms have the same sharp corners developed on some specimens and the same chipping differences between primary working and lateral edges as do the trianguloid forms. The only differences between them are due to the shape of the flake on which they were based and the degree of resharpening.

Very few of these scrapers show worn edges, but three of them have been partially resharpened without obliterating all of the earlier worn edge (pl. 3, no. 28). Several have had their beveled edges rechipped until they form an angle of slightly more than ninety degrees with the plane face of the tool, and were apparently beyond salvage by re-edging (pl. 4, nos. 16, 21, 25). I believe the majority of the small chips at the Shoop Site were a result of the resharpening of scrapers and fluted points, rather than of the manufacture of tools. The majority flake type at the site could be the retouch flake from these scrapers. Six chips were produced by thinning the edge of a scraper which had become too obtuse for resharpening; they are small lens-shaped spalls with one plane face and a convex face which shows the fine flaking and battered edge of a chipped-back scraper bevel (pl. 4, nos. 4, 5). Irregularities on some scraper edges could have been the result of such preparation for resharpening.

GRAVERS

Compared to the western Folsom sites, gravers are anything but conspicuous in any northeastern complex (except at St 4, described elsewhere). No examples were included in Gordon's collection or in our earlier collections from the Shoop Site, but eight examples eventually turned up. A specimen found by Soday is a thin flake with a tiny projecting point on a thin edge, which was irregularly retouched from one face (pl. 4, no. 7). Other projecting areas of this edge have been broken away by use, and the graver would appear to have been reshaped with wear and breakage. The actual graving tip was shaped by retouching from one plane face of the chip only. Another specimen in Soday's collection has an acute point at the end of a short flake, first shaped by retouching from the plane face of the flake (pl. 4, no. 8). The tip has been resharpened by chipping from the convex face, and shows a blunted thick end with worn facets. Two specimens found by Witthoft, one of them fragmentary, have a projecting tip on a flake edge shaped by retouching from the plane face (pl. 4, no. 6). Other possible graver fragments have been found, but are too badly damaged by breakage to be identified with any certainty.

Graver points also occur on other tools, and all represent the same type of retouch from one face, although the general appearance of most suspected examples is quite different. One side scraper, found by Witthoft, has a well-preserved graver worked at a corner of the blade at the edge which was least retouched and used (pl. 3, no. 22). Other side scrapers bear similar projections, so chipped away and damaged that their identification as gravers is not certain. The tips of these side scrapers present strong resemblances to gravers except for size and thickness; most of the extreme ends of these scrapers were broken away in use, often with a sloping, hinging fracture which indicates breakage under heavy stress. Very few of

PLATE 4. Flake tools and end scrapers from the Shoop Site.

these scrapers have been found with the tip intact, but fifteen of the acutely tapered, sharp tips broken from them have been found (pl. 3, no. 18). The character of these tips is discussed in my description of the side scrapers.

Forty of the end scrapers show working corners which probably represent a graver variant. These right-angled or somewhat acute points were worked at the ends of the broadest beveled face of the scraper, and their shaping was an integral part of the shaping of the scraping edge, not a later modification. Often edges immediately adjacent to them are somewhat concave. Almost all examples show breakage and wear from use and must have been more acute and graver-like when shaped. A single example, collected by Soday, has an apparently intact tip, acute and poorly supported (pl. 4, no. 13). The others are probably worn-out and rechipped, or less extreme, examples; judging by evidence of use-breakage, they were an important feature of many of the other end scrapers (pl. 4, nos. 14, 15, 18, 21, 22, 26, 27, 32, 34).

UNFINISHED FLUTED POINTS

Twelve broken blanks and rejects have been found on the site and cast considerable light on procedures in finishing fluted points (pl. 2, nos. 2, 3, 5–9). These blanks are apparently finished to the point where channel-flake removal was in process. Three of these were broken by the removal of a channel-flake which ended in a hinge fracture which penetrated through the blank, rather than breaking up to the nearer surface (pl. 2, nos. 3, 6, 7). Another blank split obliquely along a vein, during or after the removal of one preliminary channel-flake, and was retouched as a cutting or scraping tool (pl. 2, no. 10). Four others had had at least one final channel-flake apiece removed before breakage, and one in particular shows five such longitudinal flake scars (pl. 2, no. 6). These unfinished pieces appear to represent the blank forms or "cache blades," made up at some distant quarry site and carried in unfinished form until shortly before they were needed.

One's first impression of these blanks is that they are thick and coarsely chipped as compared to finished fluted points. Chipping is of the finer, long, somewhat parallel type on only two specimens, while more random flat chipping, short, irregular edge work, and long flat flaking are equally conspicuous on the others. Of course, finished fluted points from other sites usually show some of this random work, and shape of flake varied with the type of core reduction necessary at each point in the work. Parallel flaking seems to have been used for the even thinning of a blank, random flaking for rougher shaping from more irregular contours.

The basal ends of the blanks show no preparation of a well-defined nipple for a striking platform, but rather are slightly convex with a thick, blunt angle at the edge. These blanks were thinned by longitudinal flaking from this base, and the rejects indicate that finished points do not retain all of the surface prepared by longitudinal flaking. Eastern fluted points often show two channel flakes on a face, but the blanks show traces of other longitudinal flaking which preceded the final channel flakes and the last transverse chipping of the final surface. Some longitudinal flaking was obliterated by later chipping, in the point-shaping process. Our blanks and finished points show the processes of a peculiar chipping sequence which is characteristic of fluting in this industry, and which is discussed at greater length later. This is the triple channel flake pattern, in which two preliminary channel flakes were drawn and then the final channel flake drawn between them (fig. 2).

The basal halves of two unfinished fluted points, advanced well beyond the blank stage, are perhaps the most interesting specimens in Soday's collection from this site. The large example (pl. 2, no.

NOTES ON PLATE IV

1, 3, 4, 5, 6, 8, 10, 11, 13, 14, 15, 18, 20, 22, 23, 29, 30, 31, 35. Soday Collection.

2, 7, 9, 12, 16, 17, 19, 21, 25, 26, 27, 28, 32, 33. Pennsylvania State Museum Collection.

24, 34. Gordon Collection.

12. Pennsylvania Jasper, 18 dark brown chert of unknown source, 29 white quartzite-like chert of unknown source, rest are Onondaga Chert.

1, 2. End tools with burin-like tip.

3. Pointed flake knife used as end-tool.

4, 5. Spalls struck off end scrapers during resharpening. These show a part of the upper plane of the scraper-blade at the top, and the blunted, splintered edge of the scraper bevel at the bottom, with a trace of the lower plane of the blade back of this. These flakes were removed by a blow to the bottom face of the scraper immediately back of the beveled edge.

6–8. Gravers chipped from one face of a thin flake.

9–11. Exhausted nuclei from cores, used as end-tools after they were discarded as cores. 11 has been broken by hinge fracture from one of the flakes drawn from it.

12. Rough spall scraper, found as two pieces.

13–35. End scrapers.

2) was based on a thick blank and had been completed to the stage where the final channel flakes were being drawn. Three channel flakes on each face represent a thinning stage immediately preliminary to the final secondary chipping. One face shows a remnant of a still earlier channel flake scar, crossed by a long transverse flake scar. On each side of the central channel flakes, two long longitudinal flakes had been drawn earlier to thin the base and even up the basal edges. The point broke by hinge fracture as the last channel flake was drawn. Many of the finished points show traces of the secondary longitudinal flakes of this stage, not entirely obliterated by later chipping, and slight traces of these earlier channel flake scars are sometimes preserved on finished points (as pl. 1, nos. 3, 4, 6, 16, 17, 19, 20). The basal edge was then retouched to straighten the serrations produced by the three longitudinal flakes last drawn from each face. The transverse flaking of this unfinished point is broad and even, and the flaking of this stage is preserved on finished specimens as the flake scars adjacent to the channel but not running to the edge of the tool. The side edges of this specimen have been straightened by retouching, but the final flaking stage, which would blunt the edges of the basal half of the point, had not been started. The point shows no trace of basal or tang grinding. The other specimen (pl. 2, no. 4) was broken after the removal of a final channel flake from one face; except for this and further basal retouching, it is at the same chipping stage as the other point. However, the somewhat concave base has a central scraper-like projection which was apparently prepared as a striking platform for the removal of the other channel flake. This projection is much like the basal nipple from which channel flakes were struck in the High Plains Folsom technique, but was shaped by chipping from only one face of the blank. This specimen is of unusual interest because an earlier channel flake was drawn from the tip end of the blank. The basal retouching on this specimen appears to have been done instead of fluting, to prepare an edge for the striking off of the second of the channel flakes, but shows no suggestion of the use of any projection. I have seen no other specimen from the East which shows this distinctive nipple-like base, but this second specimen is the only example known at this stage in the shaping process, and such preparation may have been used only sporadically for channel flake removal. It certainly was not a basic part of the longitudinal flaking as illustrated on the blank fragments.

The blanks from which the fluted points were made were thick leaf-shaped quarry products which had apparently been chipped from heavy spalls. These blanks were reduced by alternate stages of transverse flaking and longitudinal flaking, until they were thin, symmetrically shaped, and straight based. The number of chipping stages probably varied with the thickness of the original blank. At this point, the refined blank was sometimes partly fluted but was to be still more deeply channeled by further longitudinal flaking. The fore part of the blank was nearly finished, with even if somewhat random flaking and straight edges, and often a medial ridge, but lacked the final tip retouch. The base was not yet concave. Two smaller channel flakes near the corners were then drawn; these defined the surface contours of the ears, left a basal projection, and formed grooves along edges of the final channel flake site. The tang edges still lacked the final retouch. At this point in the process, the final channel flakes were drawn, often obliterating all traces of earlier ones. Then the tang edges and basal edges were retouched to their final outline, obliterating most of the earlier longitudinal flake scars at the ears alongside of the flutes. Basal and tang edges were ground and the tip delicately retouched to a slightly rounded but thin edge. Later tip breakage from use probably led to further retouching of the tip and to the blunter, more round-tipped form of many of the finished points. A finished but unused tip is also illustrated (pl. 2, no. 1).

One of the most significant features which the Shoop blanks and fluted points present is the multiple channel flake pattern of the final chipping stage. Earlier longitudinal flaking was merely a rough shaping technique, but the final sequence is an important clue to the relationships of the Enterline Chert Industry. When the thick-based blank had been roughed out and the preliminary shaping completed, basal thinning was started. In most cases, this began with the removal of two smaller channel flakes from one face of the blank, by blows midway between the center of the blank base and the basal corners. In some cases, as in pl. 2, nos. 4 and 7, these flakes were small, but on other examples they are quite large. The removal of these flakes served to isolate the central part of the base as a striking platform for removal of the central channel flake. In many cases the removal of this central flake obliterated all traces of the smaller flutes, but very often conspicuous remnants of one or both were left on the finished point. In so pre-

paring the blank for the removal of the central channel flake, the flint knapper was applying core and blade technique to a bifaced tool, preparing the blank as though he were shaping the faces on a faceted core before and during the manufacture of lamellar flakes (fig. 2). This contrasts with High Plains Folsom technique, in which a nipple at the middle of the base was retouched to shape and used as a striking platform for the removal of a single channel flake. Channel flaking is obviously a new and distinct application of blade technique to a bifaced tool, and the Shoop points are intermediary between Folsom technique and its core and blade background; they provide a prototype for the Folsom point. This triple channel flake pattern is the explanation for the multiple flutes on so many eastern fluted points; rather than a degenerate Folsom technology, they represent a prototypic form closer to an ancestral blade tradition. This interpretation gains weight from the conspicuous presence of the same triple channel flake pattern on several of the very few fluted points so far found in Alaska. Likewise, this trend from an Old World blade technology to the Enterline Chert Industry to the Folsom-Lindenmeier Industry holds for each of the tool classes involved; it is as conspicuous for the scraper forms and flake knives discussed earlier as it is for the fluted points, and the type of retouch chipping on the Enterline tools is of the same basic pattern.

KNIVES AND OTHER BIFACE TOOLS

A few tools chipped on both faces, which were not projectile points, are present in the collections, but they are so poorly represented that I hesitate to describe them. One is apparently the base of an ovate knife of Onondaga chert, with used edges and one fire-spalled face (pl. 2, no. 14). One face shows a poorly developed channel flake, but the blade was not a blank for point manufacture. Other bifaces, represented by three specimens and five fragments, were apparently pieces of quarry refuse, blanks spoiled in the shaping but carried along anyway and used as rough scraping and cutting tools. One of these (pl. 2, no. 11) shows two failures in the control of channel flaking, and the battered edges from which the flutes were attempted are some of the best examples of the bruising of the flint incidental to channel flake production. One edge of this fragment was chipped to a scraper edge, and other edges show slight use. Other fragments of similar rejects were used without such scraper modification (pl. 2, no. 10). Another puzzling fragment appears to have been split from a blank in an attempt to draw a channel flake and shows both the positive and negative scars of the bulb of percussion of a shattering channel flake (pl. 2, no. 12); it was apparently used as a knife, much as ordinary chips with sharp edges were utilized without retouching. This specimen presents a remarkable parallel to Lavellois technique (as of course channel flaking does, to a lesser extent), but the resemblance is, I believe, fortuitous. These few fragments suggest that knives of more conventional types are still to be discovered in the Enterline Chert Industry.

PROJECTILE POINTS

Of the forty-eight fluted points and distinctive fragments from the site, twenty-six include at least half of the base and sixteen are whole or virtually intact. The largest specimen is of brown jasper, and is two and three-eighths inches long (pl. 1, no. 20). The other jasper specimen, a basal half, was somewhat larger (pl. 1, no. 19). The smallest Onondaga chert example is one and a half inches long, with a pentagonal outline, and is proportionately broad (pl. 1, no. 6). The shorter specimens all have a somewhat broad, stumpy appearance, and probably have had broken tips retouched. One point has the narrowest proportions and the least concave base of any fluted point I have seen (pl. 1, no. 2). Several show spalling and breakage tangent to a surface near the tip; the result of tip impact of a projectile point (pl. 1, nos. 4, 5, 12, 16, 18, 19). Seven have their greatest width at the base; the remainder are widest near the midpoint of the tool.

Despite differences in size and contour within our series, all specimens (and fragments preserving the part involved) show the following characteristics: fluting on both faces; concave base; fine retouching and smoothing on edge of concave base; slight concavity of side edges near base; fine retouching and smoothing of at least half of this concavity, extending to the ears; rounding and dulling of ears; convex edge of half of point toward tip, in parabolic outline, with convexity generally increasing near tip; flat, parallel final flaking almost always perpendicular to the edge, rarely oblique; flat random chipping or obliterated longitudinal flake scars; tips not acutely pointed; forepart of point with medial ridge; thin, finely retouched rounded point. With the exception of the blanks previously discussed, all of these points seem to

have been finished and used, and at least slightly damaged in use.

The degree of basal concavity seems to be proportional to the extent of the fluting on each point, and is probably a factor of this type of thinning. These bases, and the side edges nearby, were carefully shaped, with minute chipping and with grinding or smoothing, to an even concave edge, recurving to the ears. One fragment (pl. 1, no. 10, previously mentioned) shows a double-concave side edge which I have never seen elsewhere. The other half of this base, found since, has the same bi-concave edge. Several points have angularities in basal curve produced by channel flake removal, and these angularities were deep and acute enough so that they are not entirely rounded out and smoothed (pl. 1, nos. 3, 6, 18).

Basal smoothing is an adaptation to hafting, and is, as far as I know, always present on northeastern fluted points. Basal smoothing is not, by itself, a diagnostic of any particular importance, but in association with certain point shapes and types of chipping it is a detail of some significance in our local area (New York, Pennsylvania, Delaware, and New Jersey). It occurs on a great variety of point forms, in such Late Archaic cultures as the Laurentian and Early Coastal complexes and in the related pre-pottery complexes of Pennsylvania, with an incidence of one or two per cent. There is only one other complex in which all projectile points have basal smoothing, and that is the complex of the soapstone vessel period, which I have labeled the Transitional Period, in the Susquehanna, the Schuylkill, and the central New York areas.[12] Points of this period are very broad, taper-shoulder, semi-lozonge forms (called "butterflies" by some Pennsylvania collectors), with a constricted stem and heavy tang smoothing. Thus even in the same area, an unrelated culture at a different time period practiced extensive basal smoothing on projectile points. However, locally, basal smoothing seems to be entirely restricted to the fluted point, the Late Archaic, and the Transitional complexes. This type of tang finish, with good functional reasons, rarely implies relationship between complexes. In our assemblage (and also in the Transitional complexes) it may have additional significance. Tool forms adapted to shaft-finishing are absent here, and, especially, concave-edged scrapers are missing at the Shoop Site. Quite possibly the finished projectile point itself served as such an implement, and the smoothed edges were not only a desirable hafting feature, but were also, with some of their accompanying minute retouch, a by-product of shaft-making. Our only other culture (Transitional), with all projectile points similarly finished, is a complex with exceedingly few scrapers and none adapted to shaft working.

Fluting varies considerably, from those with slight basal thinning (pl. 1, nos. 7, 8, 9) to examples with channels not quite as large as those seen on some local jasper specimens (pl. 1, nos. 3, 12, 17). Our series shows twenty-three channel flake scars which ended at hinge fractures, and most of the channel flake scars have a concoidal-waved surface, indicating the difficulty of controlled thinning with the knapping technique by which these points were produced. A negative counterpart of the bulb of percussion, where distinguishable, is almost at the basal edge, and is generally represented merely by the greatest cross-sectional concavity of the groove on one face. A channel flake, when drawn, carried off with it some of the base of the blank and an adjacent portion of the other face, thus determining the basal concavity of the finished point. The face which was fluted first preserves less of the channel flake impression, and that fluted later begins with a more concave bulb area. One specimen (pl. 1, no. 12) shows the removal of a channel flake from the tip end of the blank.

After a blank had been thinned by preliminary fluting the point was shaped and further thinned by chipping from the edges, removing the thickness near the edges which had not been affected by the channel flakes. Some of the chipping at this stage was flat, parallel, and almost stepwise. Greatest changes in outline were made near the tip and at the sides near the base. Edge irregularities were then pressed off, removing tiny triangular chips where the parallel flaking had left serrations. This was followed by the final fluting and another stage of retouching. This final retouch and the extremely minute basal chipping were apparently pressure work, but the rest of the chipping seems to have been hammer work, not done with a stone tool. The projectile points from the Shoop Site fit closely with part of the series of scattered specimens from nearby areas, and show few important variations from type, except that the stray specimens include points of much finer execution than any at the Shoop Site, with

[12] Witthoft, Outline of Pennsylvania Indian History, 10–11.

more pronounced fluting, more regular shapes, and rarer hinge fracture.

This site is therefore to be considered typical of an industry to which many of our stray fluted points pertain. Evidence from other sites indicates that we may profitably look for concentrations of this and other fluted point components, and the frequence of much more expertly made points than any in the Enterline Industry points to one important contrast between our points and some of the longer, more delicately chipped strays. The Big Bend Site, just east of the Shenango River in Mercer County, Pennsylvania, has produced an Onondaga chert fluid point (not entirely finished) and a long side Onondaga chert side scraper, of the type described here.[13] In a previous article, I pointed out the existence of a knife form related to the fluted point, the only two examples of which came from sites which had produced a fluted point each.[14] This knife form has not yet been found at the Shoop Site, and may not be a part of this specific industry, although it certainly is a part of a fluted point complex. Another fluted point, described and illustrated in the same article, comes from a high field, the Wilhelm Site, against the North Mountain in Lebanon County Pennsylvania.[15] This field has a sparse litter of jasper chips, and has since yielded two more jasper fluted points and an Onondaga chert end scraper of the Shoop type, completely worn out. However, it has produced five elaborately retouched concave-edged scrapers, based on large flat jasper flakes, and several finely retouched large triangular flake knives of jasper, which are distinct from any other local types with which I am familiar. These tools are made from very large, thin, flat flakes, with a parallel, beautifully executed retouch suggestive of the best flaking in our stray fluted point series. The scrapers have two or four concave, spokeshave-like, bevelled edges, and other edges are retouched and utilized. I ascribe this site to the Parrish Industry rather than to the Enterline Chert Industry. A site near Shinglehouse, Potter County, Pennsylvania, on the terrace of Twelve Mile Creek, opposite the town, has produced four stumpy fluted points of black flint; the remainder of the material from the site is quartzite, largely lozenge shaped points.[16] Frank Soday calls my attention to the Spidini Site in Wyoming County, Pennsylvania, on which he found two of the short end scrapers and a fluted point of the Enterline complex, of Onondaga chert.

These occurrences, which mean little in themselves, are mentioned here because, in light of the Shoop Site collections, they need further investigation. Any site which has produced a fluted point should be hunted very carefully for weathered tools and chips of Onondaga chert and jasper. Any site with a scattering of deeply weathered Onondaga chert or Pennsylvania jasper chips should be searched intensively for a fluted point industry regardless of how much it may be masked by more intensive later occupations. In terms of possible associations mentioned above, the Enterline Chert Industry is probably not the only industry which includes fluted points, although there may be other tools in the complex which are merely not present in our samples. The geographical location of the Shoop Site, as well as other isolated occurrences, suggests that other sites of fluted point complexes may be found in high, mountainous country, and that they are so far unlocated because they are not in cultivation. The fields in the vicinity of the Shoop Site should produce stray fluted points lost in hunting, but so far none are known. In fact, the nearest occurrence of a fluted point is the terrace-edge within the northern juncture of Armstrong's Creek and the Susquehanna River, six miles as the crow flies from the Shoop Site.[17] Apparently stray fluted points are no more abundant in this sector than elsewhere.

A very important site of the Enterline Chert Industry located in Dinwiddie County, Virginia, has been reported and described by Ben C. McCary, and is of special interest both because of the close relationship of this site to the Shoop Site and because of the circumstances of its discovery and recognition.[18] The discovery of this site was

[13] In the collection of W. J. Hitchcock, Sharpsville, Pennsylvania.

[14] Witthoft, Notes on Pennsylvania fluted points, 52.

[15] *Ibid.*, 53.

[16] Specimens in the collection of Floyd Bliss, Shinglehouse, Penna.

[17] Two specimens in the collection of Frank Neidley, Harrisburg, Penna. One point is of jasper, the other of local rock crystal; the nearest occurrence of an Onondaga chert specimen is represented by a specimen which closely resembles that illustrated in pl. 1, no. 13, found by Neidley at the head of Haldimand's Island, at the mouth of the Juniata. This specimen, which is not waterworn, was found washed out of the sandy loam of an island of the Susquehanna floodplain, and, like two specimens previously described, should be as old as or newer than these deposits (Witthoft, *ibid.*, 53).

[18] Ben C. McCary, A workshop of early man in Dinwiddie County, Virginia, *American Antiquity* **17**: 9–17, 1951. I am very much indebted to McCary for additional information on this site, for access to his collections, and

no accident, but was the fruit of a carefully planned and adequately organized survey carried on over a period of several years by a group of Virginia students. Their first step was the location and description of all known stray fluted points, both in better-known collections and in the small accumulations kept by farmers. Gradually more people were drawn into the search for additional examples, and the first result was a rapid increase in the number of newly-found examples which resulted from the wider knowledge of Paleo-Indian problems among interested local persons. A large body of data on such points accumulated and was published, and the distribution of these stray examples was plotted on maps.[19] Several areas in Virginia showed a remarkably high incidence of stray fluted points, and McCary and his associates reasoned that such areas of concentration were most likely to include actual sites of a fluted point industry, and began intensive site survey work in search for such a site in one area of concentration, Dinwiddie County. This rational approach to a very difficult problem located the Williamson Site, and it is hoped that additional sites will be discovered as the same project continues. Also notable is the manner in which large numbers of people, including collectors, farmers, and many individuals seldom thought of in terms of archeology, have contributed to a body of knowledge which no individual or any small group could have managed. The Williamson family, as an example, have combed their fields almost continuously since the discovery of the site, in the hopes of building up a larger and more reliable sample of the tool types which McCary has been describing and tabulating, solely out of a desire to contribute to the solution of an intellectual problem.

The Williamson Site is long and narrow, following a ridge-top, and its location is analogous to that of the Shoop Site. The industry here is mainly in a variegated local chert, which is infrequent on local Indian sites; the predominant quartzites and silicified stones of the local Indian industries are rare on the Williamson Site. A variety of non-local flints and cherts occurs in small quantities, and the most abundant of these is Pennsylvania jasper, of which the nearest sources are in Berks and Lehigh Counties, Pennsylvania. This non-local jasper occurs with greater frequence in the series of finished tools than it does in chippage and rejectage, and represents a continuation of the pattern of flint dispersal seen at the Shoop Site, with more northerly stones predominant among non-local flints. The Williamson Site also has conspicuous later components, readily separable from the fluted point complex on the basis of lithic material and typology, and concentrated within one small portion of the whole Williamson Site. Ignoring these later scraps, we find that the Williamson industry is practically identical with that at Shoop's and is therefore ascribed to the Enterline Chert Industry. I prefer to use my name rather than one based on McCary's site because the Shoop sample is larger and includes much less in the way of later material. The Enterline types are those of the Williamson Site; the rougher fluted points, snub-nosed blade end scrapers, many with engraving points, side scrapers, unfinished fluted points (some classified as knives in McCary's report), flake knives of rougher lamellar form rather than the Hopewell and Denbigh type, and rare gravers based on flakes. The proportions between tool types at the Williamson Site are practically the same as at the Shoop Site. The conspicuous difference is the large amount of chippage and workshop debris at the Williamson Site where nearby chert sources were utilized, and the rarity of such debris at the Shoop Site. Even though the people at Williamson's had found and were exploiting a local chert source, the high frequency of Pennsylvania jasper indicates, to me, their recent arrival in eastern Virginia. The absence of more expert fluted points, of spokeshaves, of a spall industry, of bifaced gravers, and of narrow fluted knives, contrasts with the Parrish Industry, and fits exactly with the Enterline Industry, another strong argument for placing this important Virginia site very early rather than later in any series of Paleo-Indian industries.

Another site of the Enterline Chert Industry, and the most recently discovered, is Joffre Coe's site St 4 in North Carolina, at the Fall Line where the Yadkin River enters the Piedmont.[20] This site is on a narrow terrace where the gorge of the Yadkin ends at the mouth of its mountain valley, and is the highest habitable point in this part of

for encouragement and criticism in my study of site relationships.

[19] McCary, Survey and study of Folsom-like points found in Virginia.

[20] I am indebted to Coe for access to his collections from this site and for his explanations, interpretations, and comparisons of the material found at St 4, as well as for information on many other Carolina sites and components which impinge indirectly on the problems discussed here.

the Yadkin drainage. This site was discovered some years ago by H. M. Doerschuk, of Badin, North Carolina, and Coe had showed me Doerschuk's series of fluted points from this site some four years ago. Most of this large series were chipped from the coarse non-flinty silicified rock which outcrops in the mountain slope above the terrace at this site, and these points were the roughest and most atypical fluted points which either of us had seen up to that time. The series also included a fair proportion of points which were probably rejected before they were quite finished. At this time both Coe and I were much puzzled by the site, and could come to no conclusions as to its significance. It now appears that the use of this poorer local stone and attendant crudities in the finished product were the cause of our confusion.

In the meantime Coe has begun extensive excavations in this and other sites on the Fall Line in the Yadkin Valley, and the results even of preliminary work done up to the present time are rich in sequence data and in implications for the Archaic chronology of the whole Eastern Woodlands. A deep stratified site on the terrace across the river and opposite St 4 includes at least nine distinct industries arranged in physically stratified soil zones in an eight foot profile, but the lowest levels were apparently not early enough to include anything of the fluted point period, although extremely early horizons are indicated.[21] Artifact types which are distinctive of the deepest levels of this site are present as major components at St 4, but later complexes are so far not represented in the St 4 sample. St 4 consists of the Enterline Chert Industry mixed up with these other very early industries in a cultural deposit more than two feet thick, and in the preliminary excavation these industries were not separable in terms of stratigraphy or superposition, although readily so on the basis of typology.

My understanding of St 4 is based upon an examination of the collection derived from a very limited preliminary excavation by Coe, representing only four five-foot squares. While I have had the benefit of all of Coe's knowledge and suspicions about this and related sites, he is not to be held responsible for my conclusions, which are advanced with some hesitation because of the small amount of digging done here so far and because the site is so promising of important results in the future. Considering the volume of soil involved, the bulk of the stone material excavated, and especially of chippage and debris, is amazingly large. In some levels the bulk of chippage was greater that that of the soil mixed with it. All of the Enterline tool types are represented by good examples both in the local stone and in non-local flints, and the other artifacts are those of the early industries, without fluted points, which are known from deep levels of the other Fall Line site. Spokeshaves and other tools of the Parrish Industry are so far missing. The huge amounts of chippage and spalls seem to be in part a result of difficulty which these Paleo-Indian peoples had in chipping a non-flint stone to their standards. The Enterline tools are present in large numbers, however, and more than half of them are of this local stone. Gravers based on flakes, precisely like those of the Shoop and Williamson Sites, are conspicuous here, both because the sample is large and because these very delicate tools were excavated from undisturbed contexts and have not been mutilated by farming tools and other surface agents. This site is the only one to have produced an adequate graver series, largely because of better preservation; at the Shoop Site many possible gravers have been omitted from study because of recent damage to the thin flake edge on which they were based. These gravers are also in both the local stone and in non-local flints and cherts.

The non-local flints at St 4 include some specimens of the chert which predominates at the Williamson Site, and some other flints and cherts which are unfamiliar to me. We do not know as yet whether flint incidences at this site conform to the north-south displacement noted for the Shoop Site and the Williamson Site, but the notable presence of the Williamson chert suggests this. Here I should like to point out certain details of this flint displacement pattern. It is most conspicuous at Shoop's, the northernmost site, less so at Williamson's, and, by my inadequate examination of the St 4 collections, least so here, but still significant. This suggests a less rapid dispersal of the people who carried this industry as they moved further south, and less rapid migration into new regions with undepleted game resources. One important consideration is the presence in minute quantities of unidentified flints and cherts at each of the three sites; not only are the sources of these stones unknown, but they are materials which are not found on Indian sites in the same or nearby areas. I believe that my overall fa-

[21] William Haag, editor, *Newsletter*, Southeastern Arch. Confer. 3 (1) : 4, 1951.

miliarity with the flints used in the Eastern Woodlands and Ohio Valley area from the Canadian border south to Georgia is fairly adequate, and probably as good as that of anyone else for the total region, yet each of these three sites includes distinctive materials, in tiny quantities, which I had never seen before anywhere. These stones are not the nondescript materials which are so frequent in Indian sites, and they have peculiar physical characteristics which indicate they are not unusual phases of some of our local stones. At the Shoop Site the only examples of such minority stones so far identified are from the Hudson Valley. It seems very likely that these unidentified materials are stones carried much further than any of the identified materials, and, if this is the case, such flints might be very important clues to the still earlier history of the Enterline Chert Industry. I hope that this idea may be tested in the future with more data on lithic materials and flint sources. I suspect that knowledge of Canadian materials is necessary to this problem.

The most recently discovered fluted point site in the East is the Quad Site in central Alabama, as reported to me in a letter from Frank J. Soday of April 11, 1952. The site, located on a much-eroded ridge, includes an Archaic component and at least one Paleo-Indian component, and has produced several hundred artifacts in the first few weeks of surface hunting. The tools at this site include the total inventory of both the Enterline Chert Industry and the Parrish Industry, with fluted points of the Enterline type, the Clovis type, and the southeastern form with expanded ear-like corners. The Enterline scraper types are present in some number, and include the snub-nosed end scrapers with thick graving spurs. Gravers and lamellar flake knives of the Enterline forms are present, as well as spokeshaves, bipoint gravers, drills, spall-scrapers, biface knives, and combination cutting-scraping tools of the specialized Parrish forms. This assemblage is almost entirely of a blue-grey chert, a different material from that used by the Archaic occupants of the same site. A number of the fluted points and other tools of the earlier complex were, however, rechipped and used by these later Archaic people, and one of them has been made into a stemmed point. Significantly, the Archaic component here is a very distinct complex from that at the Parrish Site, and thus comparison of the collections from these two sites should answer many questions about the allocation of Parrish types to a fluted point industry. The Archaic material at the Quad Site consists mostly of broad side-notched and lanceolate points, some of which Soday compares to Krieger's Plainview Point, a type of major significance to Paleo-Indian problems on the Plains. These Archaic forms differ in lithic material and degree of patination from the objects of the Enterline and Parrish components at this site, but show a very high proportion of basal thinning and basal grinding. Smooth-base Archaic points of these shapes are found almost throughout the total Eastern Woodlands, and, although they have usually been considered Archaic minority forms at a Laurentian time level, I suspect that they represent separable complexes which were relatively early in the Archaic Epoch. They may have some direct connection with the fluted point industries, as descendants retaining some of the older flint-working traits.

The projectile points and scrapers of the Enterline Chert Industry as seen at these four sites are quite distinct from any known complex from nearby areas, and I can show no relationship between these tools and forms in any Indian culture of the region. In terms of our present knowledge, the Enterline Chert Industry is our first example of the earliest postulated culture of this area, earlier than the use of ground and polished stone tools.[22]

[22] It will be noted that in this paper I discuss the fluted point complexes, Folsom, Clovis, Denbigh, Alaskan Fluted, Enterline, and Parrish, as the earliest cultural remains in North America and as the imperishable remains of our first human inhabitants. I do not wish to imply that fluted point complexes were necessarily the only cultures in the Americas during the Paleo-Indian Period, or that cultures stressing very different tool types may not be as old on this continent. The problems of chopper-complexes at an equally early period in the Delaware Valley and in other areas are not closed, although we do not have any actual evidence of equal age for any of them. The George Lake Complex excavated by Emerson Greenman in Ontario is a quite different chopper culture which, despite the puzzles it raises, is very probably of equal antiquity. My evaluation of this complex is not based on the published material, which is not too conclusive, but on examination of the collections and discussion with Greenman. Preliminary discussions of this problem are as follows: E. F. Greenman and George M. Stanley, A geologically dated camp Site, Georgian Bay, Ontario, *Amer. Antiquity* **5**: 194–199 1940; Greenman and Stanley, The archeology and geology of two early sites near Killarney, Ontario, *Papers Mich. Acad. Sci.* **28**:505–530, 1942; Greenman and Stanley, Two Post-Nipissing sites near Killarney, Ontario, *Amer. Antiquity.* **6**: 305–313, 1941; Greenman, An early industry on a raised beach near Killarney, Ontario, *Amer. Antiquity* **8**: 260–265, 1943; Greenman, Material

Therefore one important approach is comparison of this fluted point complex with Paleo-Indian industries in other parts of North America. Actually there are few examples of such early complexes which are well-enough known for valid comparison and contrast. The projectile point form which is most closely related to ours is the Clovis fluted point, while the Folsom point is a somewhat distinct and more specialized product.[23] Our industry shows certain relationships and contrasts to the Clovis and Lindenmeier (Folsom) complexes, as well as to the early Alaska Denbigh Flint Complex, which are worth some analysis.

The last is the first excavated example of an early Alaskan industry, worked out by J. L. Giddings at the Iyatayet and other sites on Cape Denbigh, Alaska.[24] The lowest level of this site,

culture and the organism, *Amer. Anthrop. N. S.* **47**: 211–231, 1945.

Greenman's sample is adequate for characterization of his industry and the geology is convincing, even though the George Lake Industry is known only from a limited geographic area. The archeologist will think in this connection of many other claims, old and recent, for equal and higher antiquity for human cultural material in the New World, but in no other cases am I satisfied that a case has been made, either because of questionable geologic or faunal dating, because of the problem of improper collection of data, or because the samples from certain contexts are so small that they are not diagnostic of anything and might pertain to a fluted point complex as well as any other. The case for the age of the fluted point complexes, apart from recent collaborative data from radioactive carbon studies, does not depend on any single site or area, but depends on a great body of consistent evidence from several regions. This is not true of any other claims for a similarly high antiquity, even Greenman's, certain as that may seem. This does not necessarily mean that diverse cultures which were equally old will not be found, although there cannot be too many of them; it does suggest that human occupation of the North American continent much before the fluted point complexes is somewhat unlikely. It is in this sense that I consider the Shoop Site to represent our earliest level of human occupation in the Northeast.

This is in marked opposition to a recent report by George F. Carter, who considers this view scholastic and Procrustean (George F. Carter, Man in America: A criticism of scientific thought, *Scientific Monthly* **73**: 297–307, 1951). Carter is convinced of the presence of Lower Paleolithic cultures in North America during Wisconsin and pre-Wisconsin times, as a conspicuous part of the American culture sequence. I suppose there is some possibility that this might have been so, but we lack any evidence of such industries in Pleistocene geological contexts. Carter's thesis involves allegations of such occurrences in terrace gravels and old geological deposits, without published documentation, and includes ideas on such patination phenomena as "desert varnish," sandblasting, rinding, and on the formation of desert pavements; his analysis, to me, is confused and based on inadequate physiographic models. As a field archeologist involved in an area where related problems became classic, the Delaware and Susquehanna Valleys, Carter's arguments convince me that we need more of the data of the geologist and soil expert and more criticism of their procedures as generally utilized in archeological literature, rather than that we still retain an older American prejudice against antiquity. Such earlier cultures are still an open question.

[23] Edgar B. Howard, Evidence of early man in North America, *Mus. Jour.* **24**: 61–175, 1935.

Alex Krieger, who knows the Clovis material much better than I do, suggests, on the basis of the few side-scrapers and other tools known for the Clovis Industry, that this may also represent an extremely homogeneous and restricted industry, perhaps even more so than the Enterline Complex. Until the Western Plains heavy fluted point sites are better studied and until they are better known from campsites rather than from material left at the sites of gamekills, I must forego comparison of the Clovis and Enterline Industries, even though I suspect such a comparative study would be the most valuable to our knowledge of the Enterline Industry. Krieger is impressed with the parallels between the total series of eastern fluted points and the whole series of points of Clovis type on the Plains, and suggests that the total eastern series including the Shoop specimens should be compared to the whole range of the Clovis type. I am impressed by differences between varieties of eastern fluted points, whereas Krieger would question the validity of assigning them to more than one type. I would agree with Krieger in assigning the majority of the stray northeastern fluted examples to the Clovis type, without reservation, but would exempt the majority of the Enterline forms from this class, and also would not include the pentagonal fluted points of the Reagen Site or the "fish tail" forms of the Southeast in the Clovis type. The difference of opinion is very likely a factor of my poorer knowledge of the Clovis material. Nevertheless, the long, thick, heavy, eastern points with acute tips, slight channeling or very concave long flutes formed by a single channel flake, and almost straight tang edges are to my eye the same thing as the western Clovis points I have handled, and are distinct from the Enterline points, from the Ohioan type with the outturned ears and slight channeling, and from the strongly pentagonal forms. Only a very broad comparative study of both eastern and western forms will permit division of these fluted point varieties into entirely satisfactory types. My present knowledge of the Clovis material, based almost entirely on Edgar B. Howard's series from the Clovis Site in the collections of the University Museum, Philadelphia, is not adequate for such a comparison.

[24] J. L. Giddings, The Denbigh flint complex, *Amer. Antiquity* **16**: 193–203, 1951. I am indebted to Dr. Giddings and to Dr. James VanStone for access to their material and for information and rewarding discussion of this extremely important complex. Ralph Solecki, of the River Basins Survey, has also made available to me his data on an almost identical industry, the Uni-

underlying extremely early Eskimo material, is a Paleo-Indian industry lying in an old erosional surface, warped by frost and apparently of late Pleistocene age, unconformably overlaid by sterile sand. The gravels and artifactal material on this old land surface seem to be residual material, dropped from soil and occupational zones destroyed when the old erosional surface was formed. The industry at the lower level is an exceptionally sophisticated one, employing the most delicate flaking and the prettiest small tools imaginable, and has a generally Mesolithic appearance. Ground stone tools are missing, and the majority of artifact types are small, narrow trianguloid projectile points, side blades, tiny burins, and lamellar flake knives. These parallel-flaked, small tools, of obsidian and chert, are not like any of our local artifact types, but another tool series in the same level suggests the Shoop Site. Two larger trianguloid points of bolder flaking are roughly the size and shape of northeastern fluted points, and one of them has broadly channeled faces. They are rough and irregular compared to our series but suggest the same technique. A small series of end scrapers are precisely like the end scrapers of the Enterline Chert Industry, and, but for lithic material, are indistinguishable from the Enterline end scrapers; in fact, they are the only scrapers I have seen which so closely resemble those in our industry. Another scraper series in the Denbigh Flint Complex is a blade side scraper series very much like the Enterline series, except that some of the Alaskan specimens are more extensively retouched than the Pennsylvania examples, and resemble extreme specimens from the Lindenmeier Site. Lamellar flake knives, struck from polyhedral cores, are conspicuous in the Denbigh Industry. Comparison with the Enterline Chert Industry is difficult, because we have too few well-preserved examples here, but the Denbigh flakes and cores are almost, if not entirely, identical with Ohio and Illinois Hopewell types, and the Shoop Site flake knives are not so expertly executed. Altogether, the Enterline Chert Industry bears startling resemblance to a part of the Denbigh Flint Complex, and is totally unlike the remainder of this early Alaskan assemblage.

The Lindenmeier Site in Colorado was selected for comparison of classic Folsom material with our complex because the excavated sample from this site is so large and because this is the most adequately studied Paleo-Indian site. The following statements of resemblances and contrasts are based upon Dr. Frank H. Roberts' publications and upon study of his total sample from the site, which he very graciously made available to me in January, 1951.[25] Much of the following is also based on discussions with him. Description of the Lindenmeier series is much simplified in the following brief comparison.

The Lindenmeier Site has produced a large series of end scrapers, based on thick flakes, which in general style are like the predominant tool at the Shoop Site. The Lindenmeier series is much more variable in size, outline, and degree of retouch, however, and only a part of its range coincides with the Shoop series. Some few of the Colorado scrapers are identical blades, except for lithic material, and the Enterline series seems to correspond to a part of the Lindenmeier series, with many larger, thinner, more ovate, and more irregular forms at Lindenmeier. While such blades are present at Lindenmeier, they are not nearly so predominant in Roberts' series as at Shoop's, and do not form so restricted a type. As with the Denbigh Flint Complex, the major tool type in our series has its closest resemblance to a less predominant form, and the identity of form noted with the Denbigh scrapers holds with only a few specimens in Roberts' series. On the High Plains, scrapers of similar types persist as a major tool type until quite recent times, but in Pennsylvania distinctly different scraper forms are found in Archaic and Woodland complexes. Compared to the Enterline Chert Industry, the Lindenmeier series is very weakly a blade industry.

Side scrapers are conspicuous at Lindenmeier, and show greater variability than the Enterline series. Many are based on thin flakes, while others are retouched to the extreme (as are some Denbigh examples), and are curved and thicker than they are broad. Few of these show the bulbs of percussion at a working tip, as do so many from the Shoop farm. However, a mid-part of the Lindenmeier series looks very like the Shoop series and typical Denbigh examples, but the Shoop collection is more homogeneous than the Lindenmeier series. Flake knives (thin prismatic flakes

versity of Alaska Campus Complex (Ralph Solecki, How man came to North America, *Scientific American* **184**: 11–15, 1951).

[25] Frank H. H. Roberts, Jr., A Folsom Complex: Preliminary report on investigations at the Lindenmeier Site in Northern Colorado, *Smith. Misc. Coll.* **94** (4), 1935; Additional information on the Folsom complex, *Smith. Misc. Coll.* **95** (10), 1936.

or "blades") are present at Lindenmeier, and channel flakes were used as flake knives, but flake knives are not so conspicuous as in the Denbigh Flint Complex, and are more abundant than at Shoop's.

Utilized flakes of several forms are also conspicuous at Lindenmeier, and chippage was much more abundant, probably because local stone sources were used. Several important Lindenmeier artifact types are missing at Shoop's however; the concave-edged scraper, or spokeshave, the fluted knife with thick tip, the biface graver, spall knife, and grinding slabs. The two sites resemble one another in that both lack massive tools of all types, such as choppers, large blades, hatchet forms, and large knives and scrapers.

The projectile point series ascribed to the Lindenmeier complex consists entirely of fluted points, all or almost all of which show basal smoothing. However, in the very large series examined, there is not a single point which shows detailed resemblance to a point from Shoop's. The majority are shorter, smaller, and thinner than our specimens, with a parabolic outline which is "blunter"; the parabola is lower and broader, so that they are more rounded at the tip. Concavity of edge near the corner is not characteristic, and the smoothed sides are generally straight edged. The concavity of the base is less variable, and more nearly an arc on the average specimen. A longer variant at Lindenmeier is more acutely pointed and less parabolic than Shoop examples, and differs from them in many other details. These longer forms do not look like eastern fluted points.

Even more striking differences are noted in the stone working techniques. Channel flaking is much more regular, with a single channel flake drawn from the basal nipple as a more effective thinning technique. Unfinished points, broken by a hinge fracture at the end of the channel flake, are frequent. Points were apparently based on thinner and almost completely refined blanks, chipped from sheet-like fragments of jasper nodules rather than thick spalls, and fluting was almost the last step in shaping the points. Chipping is much more delicate, more parallel, and narrower than in the Enterline Chert Industry, and appears to be the result of both sequential and alternate pressure techniques, suggesting that practiced in the Kimberly Range of northern Australia, in recent years. Basal and tang smoothing is almost always present, but is not usually as strongly developed as on our examples.

The Parrish Site in Kentucky, according to William S. Webb's description of the excavated material, presents a more difficult problem for comparison, and the collections from this site should be subjected to reanalysis at some time in the future when our knowledge of Paleo-Indian technology is more adequate.[26] The Parrish Site included a minor fluted point component, a strong Late Archaic complex of Indian Knoll type, and apparently at least one other Archaic component of new type marked by choppers, which may not be well represented or important, but which has not been segregated from the other industries. Archaic and "Early Hunter" complexes were not separable by excavation data, but were segregated in the laboratory by typology. The "Early Hunter" complex is made up of tool types which are not ordinarily found in the Kentucky Archaic; the Paleo-Indian material is the residue left by the subtraction of Indian Knoll artifact types from the total collection. Webb has apparently used the criteria of crudeness as one basis for separation, with rougher tools concentrated in the early complex and more skillfully flaked pieces ascribed to Late Archaic. In terms of other Paleo-Indian complexes, this may be an extremely misleading form of analysis, and may be a partial cause for some of the major differences between the Enterline Chert Industry and Webb's Early Hunter description. Major distinctions cannot be resolved by any charge of error in Webb's analysis, however. It is apparent that the Parrish Site represents a quite different and quite aberrant industry, unless the bulk of the Paleo-Indian objects have in fact been ascribed to his Archaic component. I think this is extremely unlikely.

Webb has classified the artifacts of his Early Hunter Complex as fourteen tool types, which include several forms of utilized flakes. Seven are apparently tool types not represented at all in the Shoop Site collections. The other seven types include apparently some forms included in my type characterizations, but his types are anything but equivalent to those presented here. The majority of his end scrapers seem to be round-edged forms, often of elliptical outline, based on thin spalls of random form. Rare side scrapers of the forms found at Shoop's are apparently included in three of his types. Judging by the report, end scrapers of our types are not present in the Parrish collections, although forms like some of the crudest of the Shoop specimens are illustrated. Flake knives

[26] Webb, The Parrish Site.

described in the report include some thick blades of lamellar form, and thin prismatic flake tools of the Enterline type are not described. Two types of gravers or perforators differ markedly from our poor examples, and are almost certainly part of a quite distinct fluted point complex. Concave-edged scrapers are present in some number, and again suggest temporal differentiation of fluted point industries. Fluted points are represented by only seven examples, while the sample of other tools is as large as the Shoop sample; this suggests to me that the other tool types include a bulk of specimens from other complexes. Four non-fluted points of very different technology are also ascribed to the Early Hunter Complex, again suggesting that this component is actually an artificial composite. Blanks like the unfinished points at Shoop's are included in Webb's "Chopper or Crude Knife" type, and I suspect the rest of the type is made up of slightly worked and rejected flint nodules and of Archaic cleavers not of Indian Knoll type.

The industry from the Parrish Site includes a few blades like the Enterline Chert Industry, but also has large series which pertain to some other industry. My statements of these differences, based only on the published account, may be quite misleading. However, if we put aside the question of the proper separation of the Parrish Site material and rely fully on the published material, certain basic differences are evident. Typical High Plains Folsom and later types, such as the concave-edged scraper ("spokeshave") and the graver chipped from both faces, are present at Parrish in quantity but absent in the Enterline Chert Industry. The Enterline Industry is predominantly a lamellar blade industry, and in this it differs from all later complexes of our area; the Parrish Industry is predominantly not a blade industry, and much of it looks like conventional Archaic material of the Northeast, although not of Kentucky. Parrish relationships to Lindenmeier seem strongest where the Enterline resemblances are weakest. The Enterline Chert Industry is more markedly a blade industry than is Lindenmeier, and the Parrish series is very weakly so. The most poorly made fluted points of all are in the Enterline Chert Industry, while the few Parrish Site examples are of better execution, but not like the very delicate Lindenmeier points. The Parrish Industry looks like the Wilhelm Site and the Reagen Site rather than the Shoop Site. These ideas suggest a thesis in chronology; which should be advanced only as a rather tenuous hypothesis: the Enterline Industry (Shoop Site, Williamson Site, St 4), with the poorer points and the emphasis on blade elaboration, with little of the graver and complex-shaped scraper-knife series, and with a hint of burin technique (?), may be the oldest of the series, and nearer to a postulated Asiatic prototype; the Parrish Industry (Parrish Site, Wilhelm Site, Reagen Site), with better points, less of the heavy blade making and more simple spalling, and with gravers, spokeshaves, and round-nosed scrapers, is a later variant, comparable to the stray finely-made fluted points, thin biface knives, and concave scrapers not found on the Shoop Site. Close resemblances between the Enterline Chert Industry and the Alaskan Denbigh Flint Complex, as well as the close resemblance of the few Alaskan fluted points to our local types,[27] would suggest that the Enterline industry is closer in time to Asiatic ancestors than any other known fluted point complex. In the West, extension of these ideas on trends would make Folsom and Lindenmeier a late and locally specialized fluted point complex, with the Clovis fluted point an earlier form closer to the common ancestor of various fluted point complexes. None of the Shoop Site fluted points can be ascribed to the Clovis or Folsom types, but putting aside any idea of close resemblances and thinking of the two areas in terms of trends, I think we can set up an equation for the fluted point types as follows—Enterline: Parrish = Clovis: Folsom. These theses are at the present time not testable by excavation, and are suggested here as hypotheses based only on technological analysis of the complexes involved, not on any geological or faunal evidence, and are not to be considered seriously

[27] Ralph Solecki, How man came to North America, *Sci. Amer.* **184**: 11–15, 1951, p. 14. Includes a plate of a point remarkably like Eastern Woodlands examples, with the triple channel flake pattern and many other details described for the Shoop points. This specimen is very unlike the Clovis and Lindenmeier types, but very like our examples except that it is better fluted.

Ralph Solecki, Notes on two archeological discoveries in northern Alaska, 1950, *Amer. Antiquity* **17**: 55–57, 1951. Describes, among other artifacts, three Alaskan Fluted points (p. 56, fig. 36, *c, d, t*). These points also closely resemble eastern forms, and one of them, the same specimen as above, has the triple channel flake pattern and closely resembles the Enterline Industry points in other details. On the other hand, these Alaskan examples seem quite distinct from any High Plains specimens I have examined, of the Plainview, Clovis, or Folsom types.

until we know something of many other fluted point sites in many areas.

Such comparisons between complexes of widely separated areas, however preliminary they may be at the present time, suggest that we are dealing with strongly distinct regional variants of one major culture type, more closely related to one another than to any known Archaic or later cultures of their own areas. It seems unlikely that we can derive one of these three series (Alaskan, High Plains, Eastern) from another; they appear rather as diverging traditions, each specializing somewhat in a different direction from whatever basic tool complex was originally introduced into the American continent. The Enterline Chert Industry is the most restricted and homogeneous industry of these, and appears to have represented the most conservative tradition. In terms of our present sample, it is a remarkably stereotyped and impoverished industry.

The Enterline industry is the first discovery of an assemblage which may represent the earliest human occupation of Pennsylvania. Fluted points can now be considered as distinctive of specific industries in the area, rather than as stray problems. Typological relationships with cultures of known antiquity in other areas strongly support the thesis of priority of this complex over other Pennsylvania industries. The weathering stage of the flints, the absence of ground stone tools, and the elemental nature of the tool inventory also indicate that the Shoop Site represents the occupation of very early hunters of large game animals. At this time such areas of rugged physiography as the North Mountain section may not have been heavily wooded, and much of central Pennsylvania may have been prairie. Such a difference in biota would help explain the location of the Enterline industry sites on high ground.

As an early industry of the area, the direction of derivation of the Shoop assemblage is an important question. Series of stray fluted points from the area indicate that Paleo-Indian people in this area preferred Pennsylvania jasper as a lithic material, and often carried specimens of it into New York, New Jersey, Delaware, and Maryland. Onondaga chert was a favored material in the upper Allegheny and was used extensively in western New York and northeastern Ohio. The Shoop Site has produced very little jasper, and practically every specimen there is Onondaga chert. The Ohio cherts, used so extensively for fluted points in western Ohio, are totally unknown as fluted points found in Pennsylvania. The Shoop Site looks like an intrusion from western New York or Ontario, and the sparsity of jasper here would suggest that this intrusion was earlier than major use of Pennsylvania jasper. A similar shift of materials from North to South may be defined on sites in Virginia and North Carolina, without as strong a reflux on other sites; this flint distribution is partial documentation of a migration. Pennsylvania jasper at the Williamson Site is consistent with this displacement pattern. Pennsylvania jasper fluted points are well known from Maryland and Virginia, and there is a suspiciously high proportion of them at this Virginia Paleo-Indian site. In New York a fair number of fluted points are made from nonlocal cherts. Many of the sources are not known, but some apparently did not originate to the south. If these stones can be traced to Canadian sources and a strong distribution of them documented in New York Paleo-Indian materials and a similar high proportion of Virginia stones found to characterize more southerly fluted points, such as those at St 4, the cherts of the Shoop Site would fall into a very large geographic pattern. Without this, the Shoop Site appears to represent a migrant industry from western New York, prior to the use of local lithic materials, and the Williamson Site a new arrival at a flint outcrop. These sites look like the first local stations in the advance of our earliest peoples from the north into the unoccupied Eastern Woodlands.

Whoever they were, the people who camped at the Shoop Site were the carriers of a blade industry which is best illustrated by scraper forms; in America, their blade technique was extended to the basal thinning of projectile points. The Enterline Chert Industry is a local variant of the earliest well-documented human occupancy of North America. In a world-wide picture, it is the easternmost extension of a widespread and varied, yet somehow distinctive, blade tradition in flint technology which was distributed, in Upper Paleolithic and later times, from the Atlantic shores of Europe to the Pacific in northern Asia, with a southern extension into North Africa and the Near East and an eastern extension into Alaska and the High Plains. The origin and history of blade industries are far from well-known, but such North American complexes as the Enterline Chert Industry at the Shoop Site and related sites are relevant to problems which are nearly world-wide. The way of life and the technology

of the Shoop Site were probably not too different from that of the Upper Paleolithic of the Old World. Formally, the Paleo-Indian industries are not Neolithic; a statement which does not mean very much. Stated another way, none of the traits which are considered characteristic "Neolithic" are present in these sites, and in many respects our earliest cultures contrast almost as greatly with later Indian complexes as they do with an old-style "agriculture-pottery-ground stone tool" type of definition for Neolithic. Neither, in Old World diagnostics, were Paleo-Indian cultures "Mesolithic." There is little in later local cultures which we can by any fashion derive from the Enterline Chert Industry.

The people at the Shoop Site were apparently newcomers who did not yet use the flint of the country-side, but who used the stone of their previous abodes. Almost every sharp-edged chip and flint scrap was used as a tool; they had not yet learned to use the local flints, and they were, moreover, stingy with the flint they did have. They left remarkably little evidence of their habitation in Pennsylvania, as also in New York and other areas. They were probably the first thin vanguard in the settlement of the Northeast, highly mobile nomadic hunters of large game, contemporary with extinct mammals of the closing Pleistocene. They may not have been many generations away from Bering Strait. The prominence of blade techniques in their flint work, the absence of any "microlithic" industry, the homogeneity of their tool types, and the few contrasts which we can point out with other eastern objects of this period, as well as the relatively crude execution of their projectile points, indicate that the Shoop Site occupation was early in the American Paleo-Indian period, and is at least ten thousand years old.

NOTES ON THE SPECIMEN DRAWINGS

The drawings of specimens from the Shoop Site were prepared instead of photographs because of difficulties of making photographs adequate for illustrations. This is partly a consequence of the weathering of the specimens, and partly due to the nature of the material and of the chipping. The flaking on these tools shows very little relief, and most of the specimens show rounded contours with irregularities which do not reflect the flaking pattern. Weathering has further blurred the flake-scar edges, and the spongy eroded surfaces of the tools photograph as a diffuse surface with inconspicuous chip scars but with very strong mottling due to the variable structure of the stone. The flaking patterns are of very low contrast, but the mottling and texture variations of the chert are of very high contrast.

Two substitute procedures led to better photographs, but owing to the low relief of the surfaces these were still not satisfactory. The best pictures were made of opaque plastic casts which were made from latex molds of the specimens. These still did not show sufficient detail. Less satisfactory were pictures made of coated specimens, on which a thin layer of ammonium chloride had been condensed from vapor. Painting and dusting the surfaces with China White and other opaques is even less manageable. Owing to the low relief and weathering of the chert surfaces, boundaries of many of the chip scars can only be located by turning the specimens in the light and feeling for the contour-breaks with the fingertip and nail.

The drawings which I prepared are interpretations, as indeed are any illustrations, and are essentially flat projections of the chipping patterns of the specimens. More expert drawings could have been prepared by a more skilled draftsman; however, the necessity of showing the actual surface patterns, rather than an artist's interpretation of them, meant that I had to do them myself. Because of technical inadequacies, and in the interests of simplicity, I have not attempted to show relief by the conventions of shading, and I have ignored the convention of light directed from the upper left of a drawing. While these drawings lack much in finish and skill of execution, they are precise and painstaking reproductions of the shape, contour, and chipping detail of the specimens, and the boundaries of each chip scar, as drawn, are not a matter of opinion or estimate. Shading lines within each chip scar are concentric to the percussion point of that chip scar, and so indicate the direction from which the chip was drawn. To some extent, they also suggest the contour and shift in contour and direction of the flake scar. Hinge-fracture, where important, is indicated by hatchuring. Recently-broken and fire-damaged areas are not reconstructed in the drawings, but are indicated by irregular shading, as are edges found by old nodule surfaces in a few cases. These examples are mentioned separately in following notes.

The drawings were made from the actual specimens supplemented by projections from film transparencies. The transparencies, on Ansco Color Film, were projected to scale on the draw-

ing paper from a 300-watt projector with a front-surface mirror mounted at a forty-five degree angle in front of the lens; this permitted keeping the projector in a horizontal position, so that it did not over-heat, while the image was projected onto a horizontal sheet of paper. Slightly improved definition of the projected image is possible with a good condenser type of enlarger, but the light level is so much less that the image is not nearly so usable. A reliable drawing cannot be made from such a projected image without constant reference to the actual specimen, and actually the projected image is only useful for accurate scaling, proportioning, control of the direction of view, and locating numerous landmarks on the drawing. An opaque projector or a camera lucida, used for the same purpose, is of very little use because it removes the actual specimen from easy reference, and because the light intensity is much lower. The usefulness of the transparencies depends largely on the quality of the original photography, and, with black and white transparencies, an original negative gives better results than a positive film-strip. A competent artist would probably have little use for such "crutches," but his interpretation of such unfamiliar details as chipping-scar patterns would reflect his stylistic training, and give an impressionistic substitute for objective reproduction of the patterns I wish to show. However rough the accompanying drawings are, they represent my interpretation of the tool types involved rather than an attempt at photographic appearance by the artist's stippling and shading effects. These generally reproduce the overall appearance of a specimen but misinterpret most of the details.

In making the drawings, the projector was mounted on an elevator tripod so that it could be easily raised and lowered and made level. The image was projected to scale and leveled, and the image used to sketch in the outlines and major flake scars of the specimen. Landmarks in the projected image were generally supplied best by the mottling pattern of the stone, since colored areas of the stone could be readily correlated with the chip scar and contour details of the specimen. Each detail had to be checked against the specimen in hand. The final drawing was generally made without reference to the projection, since only the specimen in strong light could be used as a base for the final illustration. In some cases, opposite sides of the same specimen do not show quite the same outline in the drawings; this is because the two views of the specimen are not exactly opposite, are not a precise 180 degrees apart. My interpretation of the final pressure retouch on these pieces is not always accurate, since the actual chipping is frequently microscopic and since it is sometimes on an edge so oblique to horizontal that it can only be suggested as it appears from a vertical view. Areas of breakage are not indicated by projecting outlines with a broken line, since I am not attempting reconstruction of damaged specimens. Some of these areas of damage are obvious, while others are mentioned in the following text. Illustrations were selected to show range and variation rather than to illustrate the most abundant or average forms, so that the drawings are skewed in the direction of less typical examples, and, in some cases, of the less expertly made specimens.

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